Nokia Customer Care

Service Manual

RM-55 (Nokia N93)
Mobile Terminal
Part No: 9251881 (Issue 1)

COMPANY CONFIDENTIAL

Amendment Record Sheet

Amendment No	Date	Inserted By	Comments
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IMPORTANT

This document is intended for use by qualified service personnel only.

Warnings and cautions

Warnings

- IF THE DEVICE CAN BE INSTALLED IN A VEHICLE, CARE MUST BE TAKEN ON INSTALLATION IN VEHICLES FITTED WITH ELECTRONIC ENGINE MANAGEMENT SYSTEMS AND ANTI-SKID BRAKING SYSTEMS. UNDER CERTAIN FAULT CONDITIONS, EMITTED RF ENERGY CAN AFFECT THEIR OPERATION. IF NECESSARY, CONSULT THE VEHICLE DEALER/ MANUFACTURER TO DETERMINE THE IMMUNITY OF VEHICLE ELECTRONIC SYSTEMS TO RF ENERGY.
- THE PRODUCT MUST NOT BE OPERATED IN AREAS LIKELY TO CONTAIN POTENTIALLY EXPLOSIVE ATMOSPHERES, FOR EXAMPLE, PETROL STATIONS (SERVICE STATIONS), BLASTING AREAS ETC.
- OPERATION OF ANY RADIO TRANSMITTING EQUIPMENT, INCLUDING CELLULAR TELEPHONES, MAY INTERFERE WITH THE FUNCTIONALITY OF INADEQUATELY PROTECTED MEDICAL DEVICES. CONSULT A PHYSICIAN OR THE MANUFACTURER OF THE MEDICAL DEVICE IF YOU HAVE ANY QUESTIONS. OTHER ELECTRONIC EQUIPMENT MAY ALSO BE SUBJECT TO INTERFERENCE.
- BEFORE MAKING ANY TEST CONNECTIONS, MAKE SURE YOU HAVE SWITCHED OFF ALL EQUIPMENT.

Cautions

- Servicing and alignment must be undertaken by qualified personnel only.
- Ensure all work is carried out at an anti-static workstation and that an anti-static wrist strap is worn.
- Ensure solder, wire, or foreign matter does not enter the telephone as damage may result.
- Use only approved components as specified in the parts list.
- Ensure all components, modules, screws and insulators are correctly re-fitted after servicing and alignment.
- Ensure all cables and wires are repositioned correctly.
- Never test a mobile phone WCDMA transmitter with full Tx power, if there is no possibility to perform the measurements in a good performance RF-shielded room. Even low power WCDMA transmitters may disturb nearby WCDMA networks and cause problems to 3G cellular phone communication in a wide area.
- During testing never activate the GSM or WCDMA transmitter without a proper antenna load, otherwise GSM or WCDMA PA may be damaged.

ESD protection

Nokia requires that service points have sufficient ESD protection (against static electricity) when servicing the phone.

Any product of which the covers are removed must be handled with ESD protection. The SIM card can be replaced without ESD protection if the product is otherwise ready for use.

To replace the covers ESD protection must be applied.

All electronic parts of the product are susceptible to ESD. Resistors, too, can be damaged by static electricity discharge.

All ESD sensitive parts must be packed in metallized protective bags during shipping and handling outside any ESD Protected Area (EPA).

Every repair action involving opening the product or handling the product components must be done under ESD protection.

ESD protected spare part packages MUST NOT be opened/closed out of an ESD Protected Area.

For more information and local requirements about ESD protection and ESD Protected Area, contact your local Nokia After Market Services representative.

Care and maintenance

This product is of superior design and craftsmanship and should be treated with care. The suggestions below will help you to fulfil any warranty obligations and to enjoy this product for many years.

- Keep the phone and all its parts and accessories out of the reach of small children.
- Keep the phone dry. Precipitation, humidity and all types of liquids or moisture can contain minerals that will corrode electronic circuits.
- Do not use or store the phone in dusty, dirty areas. Its moving parts can be damaged.
- Do not store the phone in hot areas. High temperatures can shorten the life of electronic devices, damage batteries, and warp or melt certain plastics.
- Do not store the phone in cold areas. When it warms up (to its normal temperature), moisture can form inside, which may damage electronic circuit boards.
- Do not drop, knock or shake the phone. Rough handling can break internal circuit boards.
- Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the phone.
- Do not paint the phone. Paint can clog the moving parts and prevent proper operation.
- Use only the supplied or an approved replacement antenna. Unauthorised antennas, modifications or attachments could damage the phone and may violate regulations governing radio devices.

All of the above suggestions apply equally to the product, battery, charger or any accessory.

Company Policy

Our policy is of continuous development; details of all technical modifications will be included with service bulletins.

While every endeavour has been made to ensure the accuracy of this document, some errors may exist. If any errors are found by the reader, NOKIA MOBILE PHONES Business Group should be notified in writing/e-mail.

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- Title of the Document + Issue Number/Date of publication
- Latest Amendment Number (if applicable)
- Page(s) and/or Figure(s) in error

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Battery information

Note: A new battery's full performance is achieved only after two or three complete charge and discharge cycles!

The battery can be charged and discharged hundreds of times but it will eventually wear out. When the operating time (talk-time and standby time) is noticeably shorter than normal, it is time to buy a new battery.

Use only batteries approved by the phone manufacturer and recharge the battery only with the chargers approved by the manufacturer. Unplug the charger when not in use. Do not leave the battery connected to a charger for longer than a week, since overcharging may shorten its lifetime. If left unused a fully charged battery will discharge itself over time.

Temperature extremes can affect the ability of your battery to charge.

For good operation times with Ni-Cd/NiMh batteries, discharge the battery from time to time by leaving the product switched on until it turns itself off (or by using the battery discharge facility of any approved accessory available for the product). Do not attempt to discharge the battery by any other means.

Use the battery only for its intended purpose.

Never use any charger or battery which is damaged.

Do not short-circuit the battery. Accidental short-circuiting can occur when a metallic object (coin, clip or pen) causes direct connection of the + and - terminals of the battery (metal strips on the battery) for example when you carry a spare battery in your pocket or purse. Short-circuiting the terminals may damage the battery or the connecting object.

Leaving the battery in hot or cold places, such as in a closed car in summer or winter conditions, will reduce the capacity and lifetime of the battery. Always try to keep the battery between 15°C and 25°C (59°F and 77° F). A phone with a hot or cold battery may temporarily not work, even when the battery is fully charged. Batteries' performance is particularly limited in temperatures well below freezing.

Do not dispose of batteries in a fire!

Dispose of batteries according to local regulations (e.g. recycling). Do not dispose as household waste.

Nokia N93 Service Manual Structure

1 General Information
2 Parts Lists and Component Layouts
3 Phoenix Service Software Instructions
4 Service Tools and Service Concepts
5 Disassembly/reassembly instructions
6 BB Troubleshooting and Tuning Guide
7 RF Troubleshooting and Tuning Guide
8 Camera Module Troubleshooting
9 System Module
10 Schematics

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1 — General Information

Exit
Shooting mode
A
Options
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NOKIA
N93

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RM-55 product selection

RM-55 is a WCDMA/GSM dual mode handportable phone, supporting WCDMA 2100/EGSM 900/1800/1900.

According to GSM standard 05.05 it responds to class 4 (max. 2 W) in EGSM900, class 1 (1 W) in GSM1800 and class 1 in GSM1900. The device supports EGPRS (EDGE) class B as well as Bluetooth 2.0 + EDR (Enhanced Data Rate) standard. The handset has a full phase 2 Type Approval and it complies with the GSM Type Approval. RM-55 also has a full CE approval and FCC (Federal Communications Commission) approval.

RM-55 supports two-way video calls with two integrated cameras. It is an MMS (Multimedia Messaging Service) enabled phone with a large bright colour display and an integrated 3.2 megapixel rear camera (3x optical zoom) and a CIF digital front camera.

The MMS implementation follows the OMA (Open Mobile Alliance) MMS standard release 1.2.

WAP 2.0 compatible browser supports XHTML Mobile Profile (MP) and uses a TCP/IP stack to communicate with a gateway in network.

RM-55 uses a Symbian 9.1 operating system and support also MIDP (Mobile Information Device Profile) Java 2.0 & CLDC 1.1 (Connected Limited Device Configuration), providing a good platform for 3rd party applications.

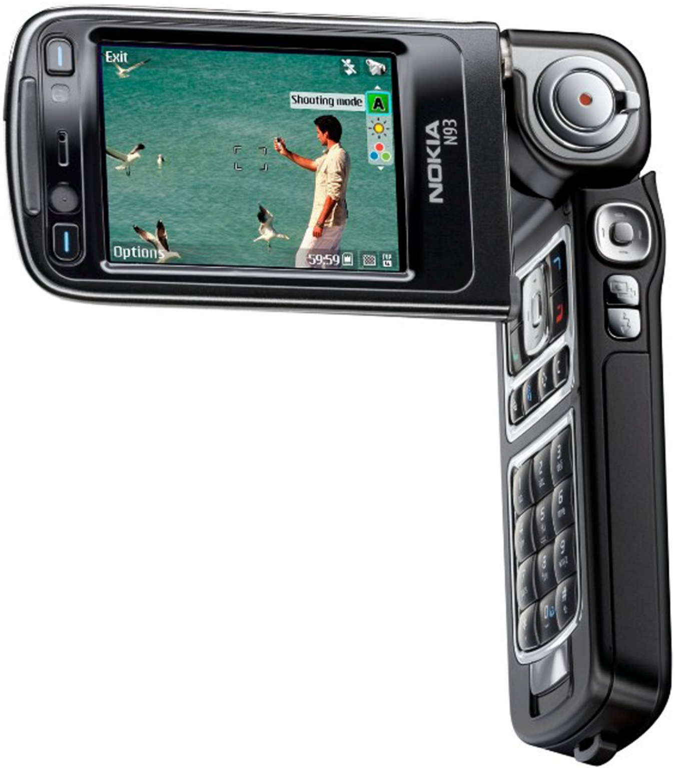

Figure 1 View of RM-55

Product features and sales package

Hardware characteristics

- Dual-mode: WCDMA2100/EGSM900/GSM1800/GSM1900 MHz
- Speech Codecs supported: AMR/FR/EFR
- WCDMA 2100 MHz with simultaneous voice and packet data (PS max speed DL/UL= 384/384kbps, CS max speed 64kpbs)
- Dual Transfer Mode (DTM) support for simultaneous voice and packet data connection in GSM/EDGE networks. Simple class A, multi slot class 11, max data speed to be: 177.6/118.4 kbits/s

- EGPRS class B, multi slot class 11, (4 Rx + 3 Tx / Max Sum 5), max speed DL/UL= 236.8 / 177.6 kbits/s.
- GPRS class B, multi slot class 11 (4 Rx + 3 Tx / Max Sum 5), max speed UL/DL= 85.6 / 64.2 kbits/s.
- 3.2 megapixel camera (2048 x 1536) with 3x continuous optical zoom and up to 20x digital zoom; High quality lens solution.
- Stereo microphone.
- LED Flash and red recording indicator LED.
- Sub camera, CIF (352 x 288) sensor.
- Large bright 2.4” QVGA (240 x 320 pixels) TFT colour display with 262,144 colours and wide viewing angle. Ambient light detector - used to optimize display brightness and power consumption
- Sub-display – 1.1” CSTN colour display (128x36), 65,536 colours.
- Keys : ITU numeric keys, Send/End keys, S60 keys (Application, Edit, Clear, 5-way navi key), Operator/ Multimedia key, Left/Right selection keys, Upper/Lower Landscape selection keys, Shutter key, Zoom key, Side 5-way navi key, Camera mode key, Flash key, Power key.
- 60 Mbytes internal user memory
- Internal antennas
- Integrated handsfree speaker
- Vibrator
- Stereo FM radio
- (U)SIM chip slot (1.8 and 3.0 V)
- TV output support (PAL/NTSC)
- miniSD memory card support (hot swappable)
- Pop-Port™ interface with USB 2.0 connectivity
- WLAN - IEEE802.11 g /b
- Bluetooth wireless technology 2.0
- Infrared

Software platform

- Symbian 9.1
- Nokia Series 60 3.0 User Interface : C++ and Java SDKs

User interface

- **Imaging**
  - **Capture**
    - Video: Record DVD-like MPEG-4 VGA 30 fps movies with stereo audio and stabilization.
    - Photos: Take high quality 3.2 megapixel pictures. User settings for Scene, Flash, White Balance, Exposure and Colour tone. Self timer support.
    - Sequence mode: Capture 6 pictures in 2 seconds.
  - **Edit**
    - Photo editor
    - Video editor
  - **View**
    - Slideshow from Gallery

    - Show photo and videos on TV
  - **Share**
    - Sending via Bluetooth, Infrared, MMS, e-mail
    - Online Album : Image/Video uploading from Gallery
  - **Print**
    - Nokia XpressPrint – direct printing from phone, memory card or via online album.
  - **Store**
    - Gallery with album support
    - Nokia Lifeblog
- **Messaging**
  - • Multimedia Messaging
    - Concatenated SMS (MO/MT)
    - E-mail (SMTP, IMAP4, POP3)
    - Predictive text input
- **Music**
  - Music player : Supports MP3/AAC/WMA with playlists
  - Stereo FM radio + Visual radio support
- **PIM**
  - Contacts, Calendar, To-do, Notes
  - Recorder, Calculator, Clock, Converter
- **Synchronization**
  - Local/Remote (using SyncML)
    - Data: Calendar, Contacts, To-do, Notes, E-mail
    - PC Applications: Microsoft Outlook (98, 2000, 2002, 2003), Outlook Express, Lotus Organizer (5.0, 6.0), Lotus Notes (5.0, 6.0)
- **Phone**
  - 3GPP Rel '99 compliant
  - Voice dialling (Flexible SIND)
  - Voice commands
  - Push to Talk (PoC)
- **Java:** MIDP2.0
- **Browser :** full web browser
- **Personalization**
  - Themes
  - SP-MIDI (64 polyphonics), True Tones
- **Location based services**
  - MT-LR Control Plane Cell-Id Positioning with DTAP LCS Location Notification

Sales package

- Transceiver with lens cover
- BP-6M li-ion battery cell

- Mini-SD memory card (128 MB)
- CA-53 connectivity cable (USB)
- CA-64U video out cable
- AC-4 travel charger
- CP-83 carrying case
- CP-84 wrist strap
- HS-23 stereo headset
- User guide, Quick start guide, and add-on application guide
- DVD-ROM (with PC Suite and other applications)

Mobile enhancements

Table 1 Audio

Enhancement	Type
Headset	HS-5
Boom Headset	HDB-4
Stereo Headset	HS-23
Music Headset	HS-20
Fashion Stereo Headset	HS-31
Display Headset	HS-6
Activity stereo headset	HS-8
Activity stereo headset	HS-29
Inductive Loopset	LPS-4
Wireless Headset	HDW-3
Wireless Clip-on Headset	HS-21W
Wireless Boom Headset	HS-4W
Wireless Headset	HS-11W
Wireless Image Headset	HS-13W
Basic Wireless Headset	HS-26W
Style Wireless Headset	HS-24W
Wireless Headset	HS-36W
Wireless Headset	HS-37W
Audio Adapter	AD-15
TTY Adapter	HDA-10

Table 2 Car

Enhancement	Type
Wireless Plug-in Car Handsfree	HF-6W

Enhancement	Type
Wireless Car Kit	CK-1W
Advanced Car Kit	CK-7W
Advanced Car Kit	CK-20W
Car Kit Phone	N616
Universal Holder	CR-39
Mobile Charger (LCH-12 update)	DC-4

Table 3 Carrying

Enhancement	Type
Carrying case	CP-83
Wrist strap	CP-84

Table 4 Data

Enhancement	Type
Wireless GPS Module	LD-1W
Connectivity Cable	CA-53
Mini SD card 128 MB	MU-17
Mini SD card 256 MB	MU-18
Mini SD card 512 MB	MU-23
Mini SD card 1GB	MU-24
Video out cable	CA-64U

Table 5 Messaging

Enhancement	Type
Wireless Keyboard	SU-8W
Digital Pen	SU-1B

Table 6 Power

Enhancement	Type
Battery LiPolymer 1100 mAh	BP-6M
Compact Charger	AC-3
Travel Charger	AC-4
Charging Adapter	CA-44

Technical specifications

Transceiver general specifications

Unit	Dimensions (L x W x T)	Weight (g)	Volume (cm^3)
Transceiver with BP-6M 1100 mAh li-ion battery back	118.2 x 55.5 x 28.2	180 (including BP-6M battery)	133

Main RF characteristics for triple-band (EGSM900/GSM1800/GSM1900) and WCDMA phones

Parameter	Unit
Cellular system	EGSM900, GSM1800/1900 and WCDMA
Rx frequency band	EGSM900: 925 - 960 MHz
	GSM1800: 1805 - 1880 MHz
	GSM1900: 1930 - 1990 MHz
	WCDMA: 2110 - 2170 MHz
Tx frequency band	EGSM900: 880 - 915 MHz
	GSM1800: 1710 - 1785 MHz
	GSM1900: 1850 - 1910 MHz
	WCDMA: 1920 - 1980 MHz
Output power	GSM900: +5 ... +33dBm/3.2mW ... 2W
	GSM1800: +0 ... +30dBm/1.0mW ... 1W
	GSM1900: +0 ... +30dBm/1.0mW ... 1W
	WCDMA -50 ... 21 dBm
Number of RF channels	GSM900: 125
	GSM1800: 375
	GSM1900: 300
	WCDMA: 277
Channel spacing	200 kHz
Number of Tx power levels	GSM900: 15
	GSM1800: 16
	GSM1900: 16

Battery endurance

Battery	Capacity (mAh)	Video call talk time	Music playback time	Talk time	Stand-by
BP-6M	1100	90 min (at 21 dBm)	108 hrs (in offline mode with wired stereo headset)	WCDMA 220 min and GSM 240 min	WCDMA 340 hrs, GSM 280 hrs

Charging times

AC-4
1 h 45 min

Environmental conditions

Table 7 Environmental conditions

Environmental condition	Ambient temperature	Notes
Normal operation	-15ºC...+55ºC	Specifications fulfilled
Reduced performance	-20ºC...-15ºC +35ºC...+55ºC	Main camera performance reduced.
Charging allowed	-25ºC...+50ºC	
Long term storage conditions	0ºC...+85ºC	

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2 — Parts Lists and Component Layouts

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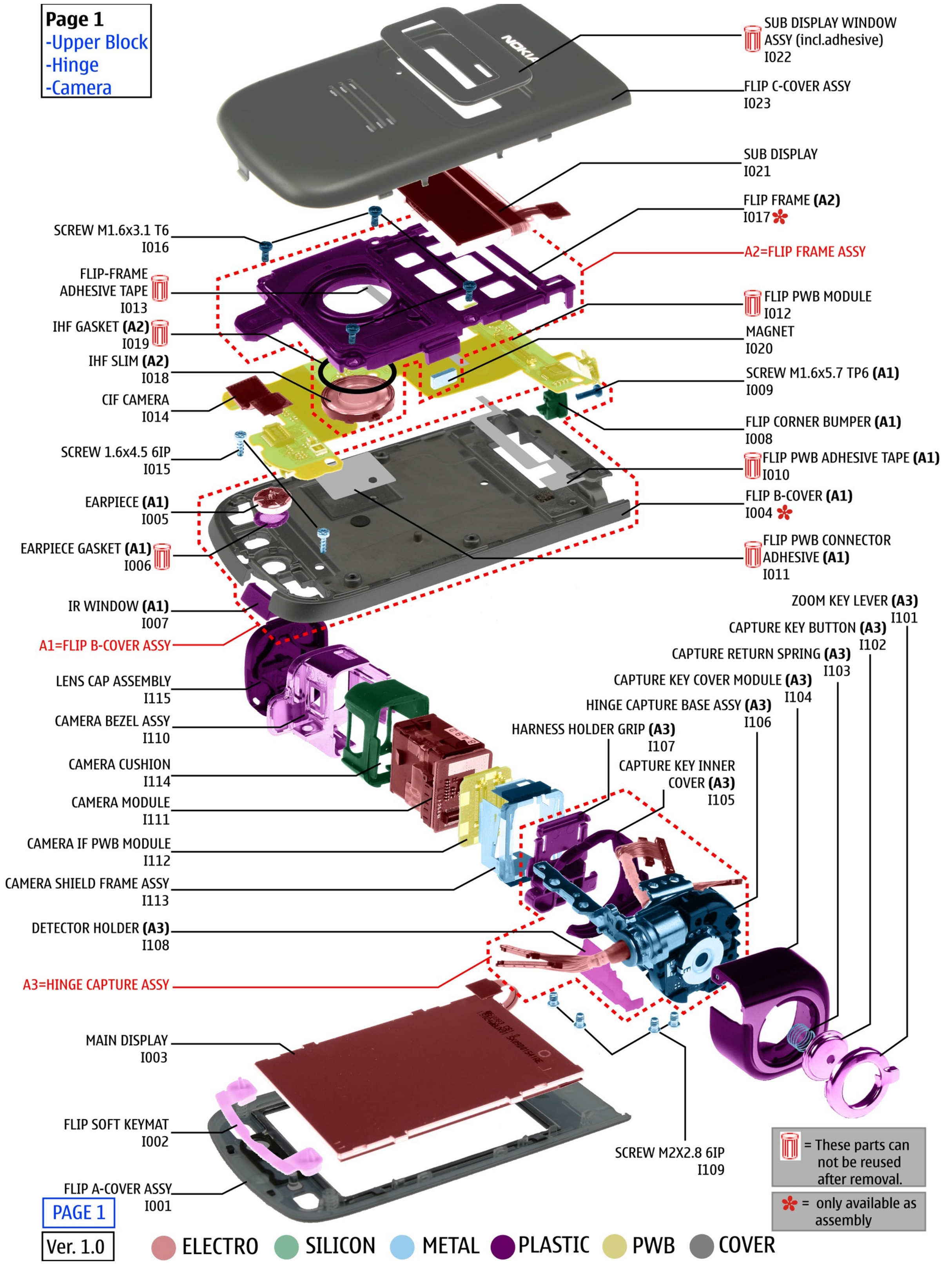
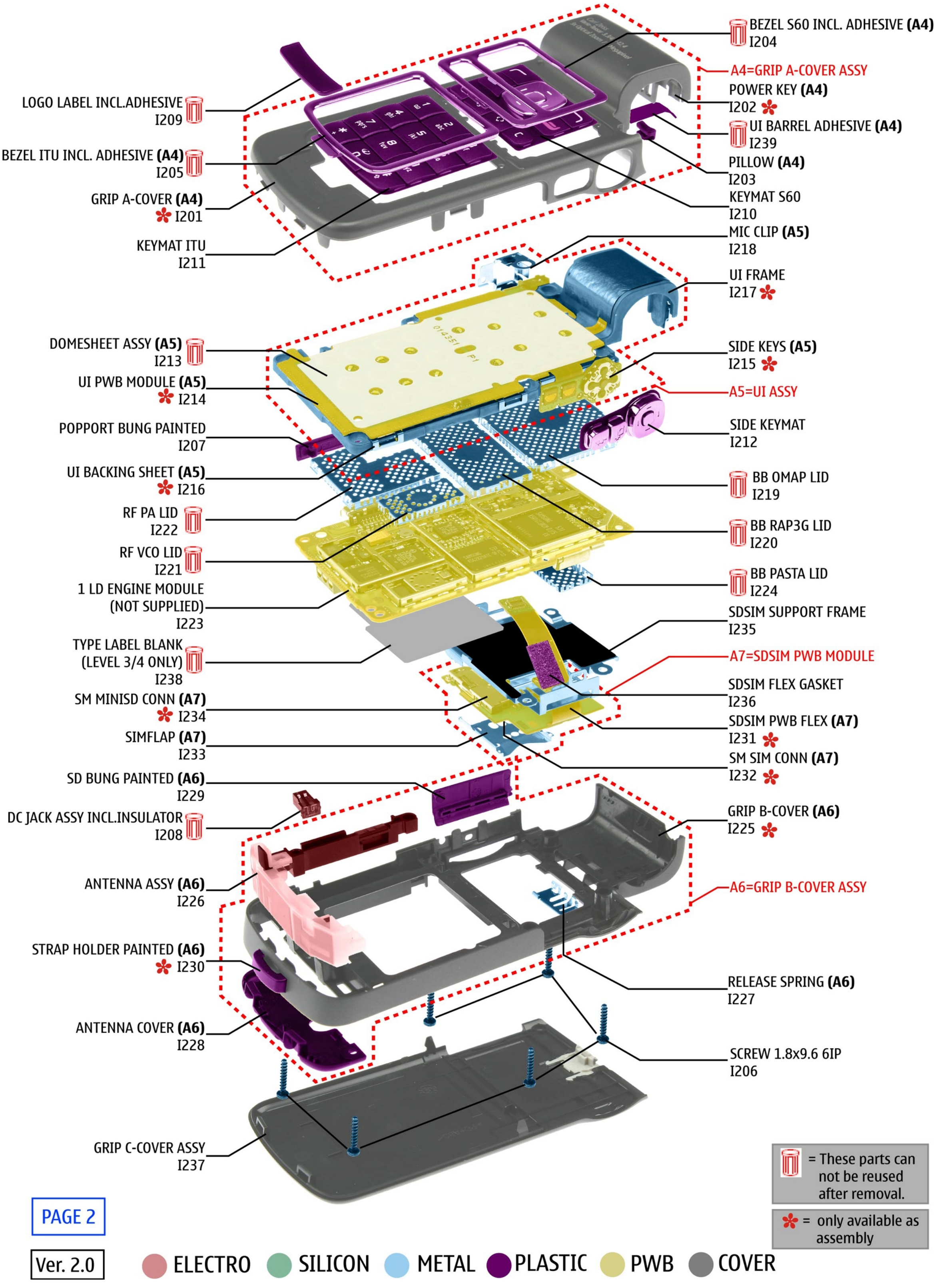
Exploded view

Upper block exploded view


Page 1
-Upper Block
-Hinge
-Camera
SUB DISPLAY WINDOW ASSY (incl.adhesive) I022
FLIP C-COVER ASSY I023
SUB DISPLAY I021
FLIP FRAME (A2) I017
A2=FLIP FRAME ASSY
FLIP PWB MODULE I012
MAGNET I020
SCREW M1.6x5.7 TP6 (A1) I009
FLIP CORNER BUMPER (A1) I008
FLIP PWB ADHESIVE TAPE (A1) I010
FLIP B-COVER (A1) I004
FLIP PWB CONNECTOR ADHESIVE (A1) I011
SCREW M1.6x3.1 T6 I016
FLIP-FRAME ADHESIVE TAPE I013
IHF GASKET (A2) I019
IHF SLIM (A2) I018
CIF CAMERA I014
SCREW 1.6x4.5 6IP I015
EARPIECE (A1) I005
EARPIECE GASKET (A1) I006
IR WINDOW (A1) I007
A1=FLIP B-COVER ASSY
ZOOM KEY LEVER (A3) I101
CAPTURE KEY BUTTON (A3) I102
CAPTURE RETURN SPRING (A3) I103
CAPTURE KEY COVER MODULE (A3) I104
HINGE CAPTURE BASE ASSY (A3) I106
HARNESS HOLDER GRIP (A3) I107
CAPTURE KEY INNER COVER (A3) I105
LENS CAP ASSEMBLY I115
CAMERA BEZEL ASSY I110
CAMERA CUSHION I114
CAMERA MODULE I111
CAMERA IF PWB MODULE I112
CAMERA SHIELD FRAME ASSY I113
DETECTOR HOLDER (A3) I108
A3=HINGE CAPTURE ASSY
MAIN DISPLAY I003
FLIP SOFT KEYMAT I002
FLIP A-COVER ASSY I001
SCREW M2X2.8 6IP I109
= These parts can not be reused after removal.
= only available as assembly
PAGE 1
Ver. 1.0
ELECTRO
SILICON
METAL
PLASTIC
PWB
COVER

Lower block exploded view


LOGO LABEL INCL.ADHESIVE I209
BEZEL ITU INCL. ADHESIVE **(A4)** I205
GRIP A-COVER **(A4)** I201
KEYMAT ITU I211
DOMESHEET ASSY **(A5)** I213
UI PWB MODULE **(A5)** I214
POPPORT BUNG PAINTED I207
UI BACKING SHEET **(A5)** I216
RF PA LID I222
RF VCO LID I221
1 LD ENGINE MODULE (NOT SUPPLIED) I223
TYPE LABEL BLANK (LEVEL 3/4 ONLY) I238
SM MINISD CONN **(A7)** I234
SIMFLAP **(A7)** I233
SD BUNG PAINTED **(A6)** I229
DC JACK ASSY INCL.INSULATOR I208
ANTENNA ASSY **(A6)** I226
STRAP HOLDER PAINTED **(A6)** I230
ANTENNA COVER **(A6)** I228
GRIP C-COVER ASSY I237
BEZEL S60 INCL. ADHESIVE **(A4)** I204
A4=GRIP A-COVER ASSY
POWER KEY **(A4)** I202
UI BARREL ADHESIVE **(A4)** I239
PILLOW **(A4)** I203
KEYMAT S60 I210
MIC CLIP **(A5)** I218
UI FRAME I217
SIDE KEYS **(A5)** I215
A5=UI ASSY
SIDE KEYMAT I212
BB OMAP LID I219
BB RAP3G LID I220
BB PASTA LID I224
SDSIM SUPPORT FRAME I235
A7=SDSIM PWB MODULE
SDSIM FLEX GASKET I236
SDSIM PWB FLEX **(A7)** I231
SM SIM CONN **(A7)** I232
GRIP B-COVER **(A6)** I225
A6=GRIP B-COVER ASSY
RELEASE SPRING **(A6)** I227
SCREW 1.8x9.6 6IP I206
= These parts can not be reused after removal.
= only available as assembly
PAGE 2
Ver. 2.0
ELECTRO
SILICON
METAL
PLASTIC
PWB
COVER

Parts lists

Mechanical spare parts list

Note: For Nokia product codes, please refer to the latest Service Bulletins on the Partner Website (PWS). To ensure you are always using the latest codes, please check the PWS on a daily basis.

ITEM / CIRCUIT REF.	QTY	PART NAME
I001	1	FLIP A-COVER ASSY
I002	1	FLIP SOFT KEYMAT
I003	1	MAIN DISPLAY
A1	1	FLIP B-COVER ASSY (I004-I011)
I004	1	FLIP B-COVER
I005	1	EARPIECE
I006	1	EARPIECE GASKET
I007	1	IR WINDOW
I008	1	FLIP CORNER BUMPER
I009	1	SCREW M1.6x5.7 TP6
I010	1	FLIP PWB ADHESIVE TAPE
I011	1	FLIP PWB CONNECTOR ADHESIVE
I012	1	FLIP PWB MODULE
I013	1	FLIP-FRAME ADHESIVE TAPE
I014	1	CIF CAMERA
I015	2	SCREW 1.6x4.5 6IP
I016	4	SCREW M1.6x3.1 T6
A2	1	FLIP FRAME ASSY (I016-I019)
I017	1	FLIP FRAME
I018	1	IHF SLIM
I019	1	IHF GASKET
I020	1	MAGNET
I021	1	SUB DISPLAY
I022	1	SUB DISPLAY WINDOW ASSY (incl.adhesive)
I023	1	FLIP C-COVER ASSY
A3	1	HINGE CAPTURE ASSY (I101-I108)
I101	1	ZOOM KEY LEVER
I102	1	CAPTURE KEY BUTTON

ITEM / CIRCUIT REF.	QTY	PART NAME
I103	1	CAPTURE RETURN SPRING
I104	1	CAPTURE KEY COVER MODULE
I105	1	CAPTURE KEY INNER COVER
I106	1	HINGE CAPTURE BASE ASSY
I107	1	HARNESS HOLDER GRIP
I108	1	DETECTOR HOLDER
I109	4	SCREW M2X2.8 6IP
I110	1	CAMERA BEZEL ASSY
I111	1	CAMERA MODULE
I112	1	CAMERA IF PWB MODULE
I113	1	CAMERA SHIELD FRAME ASSY
I114	1	CAMERA CUSHION
I115	1	LENS CAP ASSEMBLY
A4	1	GRIP A-COVER ASSY (I201-I205)
I201	1	GRIP A-COVER
I202	1	POWER KEY
I239	1	GRIP A-COVER ADHESIVE
I203	1	PILLOW
I204	1	BEZEL S60 INCL. ADHESIVE
I205	1	BEZEL ITU INCL. ADHESIVE
I206	6	SCREW 1.8x9.6 6IP
I207	1	POPPORT BUNG PAINTED
I208	1	DC JACK ASSY INCL.INSULATOR
I209	1	LOGO LABEL INCL.ADHESIVE
I210	1	KEYMAT S60
I211	1	KEYMAT ITU
I212	1	SIDE KEYMAT
A5	1	UI ASSY (I213-I218)
I213	1	DOMESHEET ASSY
I214	1	UI PWB MODULE
I215	1	SIDE KEYS
I216	1	UI BACKING SHEET
I217	1	UI FRAME

ITEM / CIRCUIT REF.	QTY	PART NAME
I218	1	MIC CLIP
I219	1	BB OMAP LID
I220	1	BB RAP3G LID
I221	1	RF VCO LID
I222	1	RF PA LID
I223	1	1 LD ENGINE MODULE
I224	1	BB PASTA LID
A6	1	GRIP B-COVER ASSY (I225-I230)
I225	1	GRIP B-COVER
I226	1	ANTENNA ASSY
I227	1	RELEASE SPRING
I228	1	ANTENNA COVER
I229	1	SD BUNG PAINTED
I230	1	STRAP HOLDER PAINTED
A7	1	SDSIM PWB MODULE (I231-I234)
I231	1	SDSIM PWB FLEX
I232	1	SM SIM CONN
I233	1	SIMFLAP
I234	1	SM MINISD CONN
I235	1	SDSIM SUPPORT FRAME
I236	1	SDSIM FLEX GASKET
I237	1	GRIP C-COVER ASSY
I238	1	TYPE LABEL BLANK

Component parts list (1LD_040)

Note: For Nokia product codes, please refer to the latest Service Bulletins on the Partner Website (PWS). To ensure you are always using the latest codes, please check the PWS on a daily basis.

BTM = Bottom

Item	Side	Grid ref.		Description and Value			Type
A1	BTM	G	13	BB PASTA SHIELD FRAME	~	~	SHIELD_040_018525
A2	Top	G	14	BB OMAP SHIELD FRAME	~	~	SHIELD_040_018524
A3	Top	G	9	BB RAP3G SHIELD FRAME	~	~	SHIELD_040_018523

Item	Side	Grid ref.		Description and Value			Type
A4	Top	J	5	RF VCO SHIELD ASSY 040-016586	~	~	SHIELD_040_018522
A5	Top	G	5	RF PA SHIELD FRAME	~	~	SHIELD_040_018501
B2200	Top	F	8	CRYSTAL 32.768KHZ +-20PPM 12.5PF	32.768kHz	~	CRYSTAL_FC_135
C2000	Top	D	6	Chipcap 5% NP0	27p	50V	0402C
C2002	Top	C	7	Chipcap X7R 10% 16V 0402	10n	16V	0402C
C2003	Top	C	7	Chipcap X7R 10% 16V 0402	10n	16V	0402C
C2012	Top	D	5	CHIPCAP X5R 470N K 25V 0603	470n	25V	0603C_H0.95
C2033	Top	C	9	Chipcap 5% NP0	10p	50V	0402C
C2034	Top	C	9	Chipcap 5% NP0	10p	50V	0402C
C2035	Top	C	9	Chipcap 5% NP0	10p	50V	0402C
C2036	Top	D	9	Chipcap 5% NP0	10p	50V	0402C
C2041	Top	J	15	Chipcap 5% NP0	68p	50V	0402C
C2042	Top	I	16	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2043	Top	D	7	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2070	Top	D	5	CHIPTCAP 150U M 10V 6X3.2X1.5	150u_10V	10V	TANT_C_6.2X3.4_H1.7
C2151	BTM	J	12	Chipcap X7R 10% 50V 0402	1n0	50V	0402C
C2152	BTM	J	12	Chipcap 5% NP0	12p	50V	0402C
C2153	BTM	J	12	Chipcap 5% NP0	12p	50V	0402C
C2155	BTM	G	17	Chipcap X7R 10% 50V 0402	1n0	50V	0402C
C2156	BTM	G	17	Chipcap X7R 10% 50V 0402	1n0	50V	0402C
C2157	BTM	G	17	Chipcap X7R 10% 50V 0402	1n0	50V	0402C
C2158	BTM	D	16	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2165	Top	H	10	Chipcap 5% X7R	820p	50V	0402C
C2201	Top	G	9	CHIPCAP X5R 1U5 K 4V 0402	1u5	4V	0402C

Item	Side	Grid ref.		Description and Value			Type
C2202	Top	E	8	CHIP ARRAY X5R 2X1U K 6V3 MA 0405	2x1u	6.3V	0405_GNM23
C2205	Top	E	8	Chipcap X7R 10% 50V 0402	1n0	50V	0402C
C2211	Top	G	10	CHIPCAP X5R 4U7 K 10V 0805	4u7	10V	0805C
C2213	Top	G	9	CHIP ARRAY X5R 2X1U K 6V3 MA 0405	2x1u	6.3V	0405_GNM23
C2215	Top	G	9	CHIP ARRAY X5R 2X1U K 6V3 MA 0405	2x1u	6.3V	0405_GNM23
C2216	Top	F	8	CHIPCAP X5R 1U5 K 4V 0402	1u5	4V	0402C
C2217	Top	E	9	CHIPCAP X5R 1U5 K 4V 0402	1u5	4V	0402C
C2220	Top	F	10	CHIP ARRAY X5R 2X1U K 6V3 MA 0405	2x1u	6.3V	0405_GNM23
C2222	Top	G	9	CHIPCAP X5R 1U K 6V3 0603	1u0	6.3V	0603C
C2225	Top	F	10	CHIPCAP X5R 1U K 6V3 0603	1u0	6.3V	0603C
C2226	Top	G	8	CHIPCAP X5R 1U K 6V3 0603	1u0	6.3V	0603C
C2227	Top	F	9	CHIP ARRAY X5R 2X1U K 6V3 MA 0405	2x1u	6.3V	0405_GNM23
C2228	Top	F	9	CHIP ARRAY X5R 2X1U K 6V3 MA 0405	2x1u	6.3V	0405_GNM23
C2231	Top	F	10	CHIPCAP X5R 10U M 6V3 0805	10U	6V3	0805C
C2232	Top	F	10	CHIP ARRAY X5R 2X1U K 6V3 MA 0405	2x1u	6.3V	0405_GNM23
C2300	Top	E	13	Chipcap X7R 10% 16V 0402	10n	16V	0402C
C2301	Top	F	13	CHIPCAP X5R 22U M 6V3 0805	22u	6V3	0805C
C2302	Top	F	12	CHIPCAP X5R 22U M 6V3 0805	22u	6V3	0805C

Item	Side	Grid ref.		Description and Value			Type
C2303	Top	E	14	CHIPCAP X5R 1U K 6V3 0603	1u0	6.3V	0603C
C2304	Top	F	13	Chipcap X7R 10% 16V 0402	10n	16V	0402C
C2307	Top	E	14	CHIPCAP X5R 1U K 6V3 0603	1u0	6.3V	0603C
C2309	Top	F	12	CHIPCAP X5R 22U M 6V3 0805	22u	6V3	0805C
C2312	Top	E	14	CHIP ARRAY X5R 2X1U K 6V3 MA 0405	2x1u	6.3V	0405_GNM23
C2320	Top	E	14	Chipcap 5% NP0	10p	50V	0402C
C2360	Top	E	12	CHIPCAP X5R 4U7 M 25V 0805	4u7	25V	0805C
C2361	Top	E	13	CHIPCAP X5R 4U7 M 25V 0805	4u7	25V	0805C
C2800	Top	H	9	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2801	Top	J	10	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2802	Top	I	8	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2803	Top	H	9	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2804	Top	H	8	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2805	Top	J	9	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2806	Top	H	10	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2807	Top	J	10	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2808	Top	J	9	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2809	Top	H	8	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2810	Top	H	8	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2811	Top	I	10	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6

Item	Side	Grid ref.		Description and Value			Type
C2812	Top	H	8	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2813	Top	I	8	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2814	Top	H	9	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2815	Top	J	9	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2816	Top	H	10	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2817	Top	H	8	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2818	Top	J	10	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2819	Top	H	8	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2820	Top	J	10	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2821	Top	J	8	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C2822	Top	H	10	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4200	Top	C	16	CHIPCAP X5R 1U K 6V3 0603	1u0	6.3V	0603C
C4201	Top	D	16	CHIPCAP X5R 22U M 6V3 0805	22u	6V3	0805C
C4204	Top	C	15	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4205	Top	E	15	CHIPCAP X5R 22U M 6V3 0805	22u	6V3	0805C
C4207	Top	J	14	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4209	Top	E	15	CHIPCAP X5R 22U M 6V3 0805	22u	6V3	0805C
C4210	Top	C	15	CHIPCAP X5R 1U K 6V3 0603	1u0	6.3V	0603C
C4211	Top	C	16	CHIPCAP X5R 1U K 6V3 0603	1u0	6.3V	0603C
C4213	Top	D	16	CHIPCAP X5R 0U47 K 6.3V 0402	0u47	6V3	0402C

Item	Side	Grid ref.		Description and Value			Type
C4214	Top	D	16	CHIPCAP X5R 1U5 K 4V 0402	1u5	4V	0402C
C4215	Top	C	16	CHIPCAP X5R 1U K 6V3 0603	1u0	6.3V	0603C
C4216	Top	E	16	CHIPCAP X5R 22U M 6V3 0805	22u	6V3	0805C
C4217	Top	D	16	CHIPCAP X5R 1U K 6V3 0603	1u0	6.3V	0603C
C4219	Top	I	15	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4220	Top	C	16	CHIPCAP X5R 0U47 K 6.3V 0402	0u47	6V3	0402C
C4311	Top	E	15	CHIPCAP X5R 1U5 K 4V 0402	1u5	4V	0402C
C4312	Top	E	15	CHIPCAP X5R 1U5 K 4V 0402	1u5	4V	0402C
C4800	Top	F	13	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4801	Top	H	15	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4802	Top	I	11	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4803	Top	J	12	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4804	Top	F	13	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4806	Top	F	12	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4807	Top	H	11	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4808	Top	H	11	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4813	Top	J	15	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4814	Top	G	11	CHIPCAP X5R 1U5 K 4V 0402	1u5	4V	0402C
C4816	Top	G	11	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4817	Top	H	11	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6

Item	Side	Grid ref.		Description and Value			Type
C4818	Top	H	11	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4819	Top	I	11	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4820	Top	G	15	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4821	Top	H	15	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4822	Top	H	15	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4823	Top	J	13	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4824	Top	F	13	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4825	Top	G	15	CHIPCAP X5R 1U5 K 4V 0402	1u5	4V	0402C
C4826	Top	F	14	CHIPCAP X5R 1U5 K 4V 0402	1u5	4V	0402C
C4827	Top	F	13	Chipcap 5% NP0	10p	50V	0402C
C4828	Top	F	14	Chipcap 5% NP0	22p	50V	0402C
C4830	Top	H	15	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4832	Top	J	14	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4833	Top	J	13	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4834	Top	F	12	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4835	Top	F	14	CHIPCAP X5R 1U5 K 4V 0402	1u5	4V	0402C
C4836	Top	F	14	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4838	Top	I	15	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C4850	Top	G	15	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C5250	Top	C	14	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C5251	Top	C	14	CHIPCAP X5R 1U K 6V3 0603	1u0	6.3V	0603C

Item	Side	Grid ref.		Description and Value			Type
C6100	Top	D	12	CHIPCAP X5R 100N K 10V 0402	100n	10V	0402C
C6101	Top	D	12	CHIPCAP X5R 100N K 10V 0402	100n	10V	0402C
C6150	Top	C	13	CHIPCAP X5R 100N K 10V 0402	100n	10V	0402C
C6157	Top	D	11	CHIPCAP X5R 100N K 10V 0402	100n	10V	0402C
C6158	Top	C	11	CHIPCAP X5R 100N K 10V 0402	100n	10V	0402C
C6190	Top	E	5	Chipcap X7R 10% 16V 0402	10n	16V	0402C
C6191	Top	E	6	Chipcap X7R 10% 16V 0402	10n	16V	0402C
C6195	Top	D	11	Chipcap 5% NP0	100p	50V	0402C
C6197	Top	E	6	Chipcap X7R 10% 16V 0402	10n	16V	0402C
C6300	BTM	F	12	CHIPCAP X5R 4U7 K 6V3 0603	4u7	6.3V	0603C
C6301	BTM	F	13	CHIPCAP X5R 4U7 K 6V3 0603	4u7	6.3V	0603C
C6302	BTM	D	14	Chipcap X7R 10% 16V 0402	10n	16V	0402C
C6304	BTM	E	12	CHIPCAP X5R 4U7 K 6V3 0603	4u7	6.3V	0603C
C6305	BTM	E	13	CHIPCAP X7R 33N K 10V 0402	33n	10V	0402C
C6306	BTM	E	13	CHIPCAP X5R 4U7 K 6V3 0603	4u7	6.3V	0603C
C6421	BTM	G	13	CHIPCAP X7R 33N K 10V 0402	33n	10V	0402C
C6434	BTM	E	13	CHIPCAP X5R 2U2 K 6V3 0603	2u2	6V3	0603C
C6435	BTM	E	12	CHIPCAP X5R 1U0 K 10V 0603	1u0	10V	0603C_H0.95
C7504	Top	F	3	CHIPCAP X5R 4U7 K 6V3 0603	4u7	6.3V	0603C
C7506	Top	E	4	CHIPCAP X5R 10UF 6V3 0603	10u	4V	0603C
C7510	Top	F	3	Chipcap 5% NP0	10p	50V	0402C

Item	Side	Grid ref.		Description and Value			Type
C7513	Top	H	6	CHIPCAP X5R 4U7 K 6V3 0603	4u7	6.3V	0603C
C7514	Top	H	5	CHIPCAP X5R 4U7 K 6V3 0603	4u7	6.3V	0603C
C7515	Top	F	7	CHIPCAP X5R 4U7 K 6V3 0603	4u7	6.3V	0603C
C7516	Top	G	7	CHIPCAP X5R 4U7 K 6V3 0603	4u7	6.3V	0603C
C7517	Top	J	6	Chipcap 5% X7R	3n9	50V	0402C
C7518	Top	J	7	Chipcap X7R 10% 16V 0402	10n	16V	0402C
C7520	Top	F	6	CHIPCAP X5R 100N K 10V 0402	100n	10V	0402C
C7522	Top	I	5	CHIPCAP NP0 2N2 G 16V 0603	2n2	16V	0603C
C7524	Top	J	5	Chipcap 5% NP0	10p	50V	0402C
C7525	Top	I	5	CHIPCAP NP0 560P J 50V 0603	560p	50V	0603C
C7526	Top	J	5	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C7587	Top	E	4	CHIPCAP X5R 4U7 K 6V3 0603	4u7	6.3V	0603C
C7600	Top	F	2	Chipcap 5% NP0	15p	50V	0402C
C7612	Top	F	5	CERCAP X7R 22N K 16V 0402	22n	16V	0402C
C7621	Top	H	6	CHIPCAP X7R 33N K 10V 0402	33n	10V	0402C
C7660	Top	H	2	Chipcap +-0.25pF NP0	1p8	50V	0402C
C7661	Top	G	2	Chipcap +-0.25pF NP0	1p2	50V	0402C
C7662	Top	G	2	Chipcap +-0.25pF NP0	1p8	50V	0402C
C7665	Top	H	5	CHIPCAP NP0 HQ 1.0P B 16V 0402	1p0	16V	0402C
C7666	Top	H	6	Chipcap 5% NP0	10p	50V	0402C
C7668	Top	H	7	Chipcap 5% NP0	27p	50V	0402C
C7670	BTM	D	2	CHIPCAP NP0 HQ 1P5 B 25V 0402	1p5	25V	0402C_AVX

Item	Side	Grid ref.		Description and Value			Type
C8520	BTM	E	15	CHIPCAP X5R 1U K 25V 0603	1u0	25V	0603C_H0.95
C8521	BTM	F	17	CHIPCAP X5R 1U K 6V3 0603	1u0	6.3V	0603C
C8522	BTM	E	15	CHIPCAP X5R 1U K 6V3 0603	1u0	6.3V	0603C
C8523	BTM	E	17	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
C8602	BTM	B	15	CHIPCAP X5R 100N K 10V 0402	100n	10V	0402C
C8704	BTM	H	12	CHIPCAP X5R 2U2 K 10V 0805	2u2	10V	0805C
C8705	BTM	G	12	Chipcap 5% NP0	33p	50V	0402C
C8706	BTM	H	12	CHIPCAP X5R 4U7 K 6V3 0805	4u7	6V3	0805C
C8707	BTM	H	13	CHIPCAP X5R 1U0 K 10V 0603	1u0	10V	0603C_H0.95
C8708	BTM	H	13	Chipcap 5% NP0	10p	50V	0402C
C8709	BTM	G	13	CHIPCAP X5R 1U0 K 10V 0603	1u0	10V	0603C_H0.95
C8710	BTM	I	13	CHIPCAP X5R 1U0 K 10V 0603	1u0	10V	0603C_H0.95
C8711	BTM	I	13	Chipcap 5% NP0	10p	50V	0402C
C8712	BTM	H	13	CHIPCAP X5R 1U0 K 10V 0603	1u0	10V	0603C_H0.95
C8720	Top	H	16	CHIPCAP X5R 100N K 10V 0402	100n	10V	0402C
C8721	Top	G	15	CHIPCAP X5R 22U M 6V3 0805	22u	6V3	0805C
C8726	BTM	H	15	CHIPCAP X5R 10U M 6V3 T=0.95mm 0805	10u	6V3	0805C_H0.95
C8727	BTM	I	15	CHIPCAP X5R 10U M 6V3 T=0.95mm 0805	10u	6V3	0805C_H0.95
C8728	BTM	H	15	CHIPCAP X5R 10U M 6V3 T=0.95mm 0805	10u	6V3	0805C_H0.95
C8729	BTM	I	15	CHIPCAP X5R 10U M 6V3 T=0.95mm 0805	10u	6V3	0805C_H0.95

Item	Side	Grid ref.		Description and Value			Type
C8735	Top	H	16	CHIPCAP X5R 2U2 K 25V 0805	2u2	25V	0805C
C8900	BTM	F	15	Chipcap 5% NP0	27p	50V	0402C
C8903	BTM	E	15	CHIPCAP X5R 1U K 6V3 0603	1u0	6.3V	0603C
C8904	BTM	E	15	Chipcap 5% NP0	27p	50V	0402C
C8906	BTM	I	16	CHIPCAP X5R 1U K 6V3 0603	1u0	6.3V	0603C
C8908	BTM	F	15	CHIPCAP X5R 1U K 6V3 0603	1u0	6.3V	0603C
C8920	BTM	H	17	CHIPCAP X5R 1U K 6V3 0603	1u0	6.3V	0603C
C8922	Top	E	9	Chipcap X7R 10% 50V 0402	1n0	50V	0402C
C8923	Top	E	9	Chipcap X7R 10% 50V 0402	1n0	50V	0402C
C8940	BTM	H	15	Chipcap 5% NP0	10p	50V	0402C
C9300	Top	F	14	CHIPCAP X5R 100N M 16V 0402	100n	16V	0402C_H0.6
D1000	Top	I	9	COMBO 128M NOR +128M DDR DRAM FBGA128	8Mx16 / 8Mx16	~	FBGA128_EMPTY
D1001	Top	H	13	COMBO 1G M3 + 512M DDR DRAM FBGA152	64Mx16/16Mx32	~	FBGA152_EMPTY
D2031	Top	I	15	VIDEO AMPLIFIER OPA361 3V SC70	~	~	PDSO_G6
D2032	Top	C	8	SINGLE BUFFER 74LVC1G07 SOT353/SC70	~	~	PDSO_G5_2.25X1.4
D2230	Top	E	8	SINGLE INV 74LX1G04	~	~	FC_4_1.12X1.12
D2800	Top	I	9	RAP3GS V2.0E-PA VFBGA	~	~	VFBGA343
D4800	Top	H	13	MCU OMAP2420POP ESHS2.1.1 N1 PBGA447	~	~	PBGA447
D4801	Top	J	14	IC 2XBUFFER 74LVC2G34YZTR WCSP6	~	~	XBGA_N6_1.45X0.95_H0.625

Item	Side	Grid ref.		Description and Value			Type
D8720	Top	H	15	OR-GATE 2INPUT 74LVC1G32 SC70-5	~	~	PDSO_G5
D8740	Top	H	16	WHITE LED DRIVER AN30251A QFN16	~	~	QFN16P
D9300	Top	F	14	IC 2XBUFFER 74LVC2G34YZTR WCSP6	~	~	XBGA_N6_1.45X0.95_H0.625
F2000	Top	C	5	SM FUSE F 2.0A 32V	2A	~	0603_FUSE_AVX2MATS
F8720	Top	H	15	SM FUSE F 2.0A 32V	2A	~	0603_FUSE_AVX2MATS
G2200	Top	E	7	RTC BACUP CAPAC 311 SIZE FOR 2.6V 4UAH	2.6V	~	BATTER_EECEP
G7501	Top	I	7	VCTCXO 38.4MHZ 2.5V 2MA	38.4MHz	~	NKG3176B_H1.0
G7502	Top	J	5	VCO 3296-3980MHZ 4-BAND MATSUSHITA	3296-3980MHz	~	VCO_DCS02733
L2000	Top	C	5	FERR.BEAD 220R/100M 2A 0R05 0603	220R/100MHz	~	0603_BLM
L2001	Top	C	7	CHIP BEAD ARRAY 2X1000R 0405	2x1000R/100MHz	~	0405_2_MATSU
L2030	Top	C	6	FERRITE BEAD 0R5 600R/100MHZ 0603	600R/100MHz	~	0603_BLM
L2031	Top	C	6	FERRITE BEAD 0R5 600R/100MHZ 0603	600R/100MHz	~	0603_BLM
L2032	Top	C	6	FERRITE BEAD 0R5 600R/100MHZ 0603	600R/100MHz	~	0603_BLM
L2033	Top	C	6	FERRITE BEAD 0R5 600R/100MHZ 0603	600R/100MHz	~	0603_BLM
L2034	Top	C	9	CHIP COIL 68N J Q17/300M 0402	68nH	~	0402L_XL

Item	Side	Grid ref.		Description and Value			Type
L2152	Top	E	10	FERR.BEAD 220R/ 100M 2A 0R05 0603	220R/ 100M Hz	~	0603_BLM
L2153	Top	E	10	FERR.BEAD 220R/ 100M 2A 0R05 0603	220R/ 100M Hz	~	0603_BLM
L2154	Top	E	10	FERR.BEAD 220R/ 100M 2A 0R05 0603	220R/ 100M Hz	~	0603_BLM
L2155	Top	D	10	FERR.BEAD 220R/ 100M 2A 0R05 0603	220R/ 100M Hz	~	0603_BLM
L2156	BTM	D	15	FERR.BEAD 220R/ 100M 2A 0R05 0603	220R/ 100M Hz	~	0603_BLM
L2202	Top	G	8	FERR.BEAD 220R/ 100M 2A 0R05 0603	220R/ 100M Hz	~	0603_BLM
L2203	Top	G	10	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R/ 100M Hz	~	FERRITE_0402
L2204	Top	F	9	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R/ 100M Hz	~	FERRITE_0402
L2205	Top	F	10	FERR.BEAD 220R/ 100M 2A 0R05 0603	220R/ 100M Hz	~	0603_BLM
L2206	Top	G	10	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R/ 100M Hz	~	FERRITE_0402
L2207	Top	F	10	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R/ 100M Hz	~	FERRITE_0402
L2301	Top	E	12	FERR.BEAD 220R/ 100M 2A 0R05 0603	220R/ 100M Hz	~	0603_BLM
L2302	Top	F	12	INDUCT WW 10UH 0A65 0R35 4X4X1.2	10uH	~	CHOKE_SER400_H1.2
L2310	Top	E	11	FERR.BEAD 220R/ 100M 2A 0R05 0603	220R/ 100M Hz	~	0603_BLM
L2311	Top	E	12	CHOKE 22U M 0R7 0.35A 3.0x3.0x1.5	22uH	~	CHOKE_SER300_H1.5

Item	Side	Grid ref.		Description and Value			Type
L4200	Top	D	14	FERR.BEAD 220R/ 100M 2A 0R05 0603	220R/ 100M Hz	~	0603_BLM
L4201	Top	D	16	FERR.BEAD 220R/ 100M 2A 0R05 0603	220R/ 100M Hz	~	0603_BLM
L4203	Top	F	15	INDUCT WW 4.7UH M 1.15A 0R12 4X4X1.8	4u7H	~	CHOKE_SER400
L4205	Top	E	16	CHOKE 4U7 0.86A 0R2 3X3X1.5	4u7H	~	CHOKE_SER300_H1.5
L4850	Top	G	15	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R/ 100M Hz	~	FERRITE_0402
L5250	Top	C	14	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R/ 100M Hz	~	FERRITE_0402
L6300	BTM	F	12	INDUCT WW 2.2UH 1A2 310 CASE SIZE	2u2H	~	CHOKE_SER300
L6451	BTM	B	7	CHIP COIL 2N7 +-0N1 Q35/1GHZ 0402	2n7H	~	0402L_H0.45
L7515	Top	F	4	CHOKE 3U3 1.2A 0R096 3X3X1.5	3u3H	~	CHOKE_SER300_H1.5
L7516	Top	G	7	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R/ 100M Hz	~	FERRITE_0402
L7518	Top	F	3	FERRITE BEAD 0R01 28R/ 100MHZ 0603	28R/ 100M Hz	~	FERRITE_FBMJ1608
L7650	BTM	D	2	CHIP COIL 1N8 +-0N3 Q31/800M 0402	1n8H	~	0402L
L7655	Top	G	2	CHIP COIL 10N G Q25/1GHZ 0402	10nH	~	0402L_H0.45
L7656	Top	G	2	CHIP COIL 6N8 +-0N1 Q26/1GHZ 0402	6n8H	~	0402L_H0.45
L7657	Top	D	4	CHIP COIL 2N2 +-0N3 Q30/800M 0402	2n2H	~	0402L

Item	Side	Grid ref.		Description and Value			Type
L7658	Top	E	4	FERRITE BEAD 0R01 28R/100MHZ 0603	28R/100MHz	~	FERRITE_FBMJ1608
L7660	BTM	D	2	CHIP COIL 10N G Q25/1GHZ 0402	10nH	~	0402L_H0.45
L7665	Top	H	5	CHIP COIL 2N2 +-0N3 Q30/800M 0402	2n2H	~	0402L
L8710	BTM	H	14	FERRITE BEAD 0R25 120R/100MHZ 0402	120R/100MHz	~	0402L
L8720	Top	F	16	INDUCT WW 4.7UH M 1.15A 0R12 4X4X1.8	4u7H	~	CHOKE_SER400
L8902	BTM	E	15	FERRITE BEAD 0R5 600R/100MHZ 0603	600R/100MHz	~	0603_BLM
L8903	BTM	I	17	FERRITE BEAD 0R5 600R/100MHZ 0603	600R/100MHz	~	0603_BLM
L8904	BTM	F	15	FERRITE BEAD 0R5 600R/100MHZ 0603	600R/100MHz	~	0603_BLM
L8910	BTM	H	17	FERRITE BEAD 0R5 600R/100MHZ 0603	600R/100MHz	~	0603_BLM
M2150	BTM	J	14	SMD VIBRA MOTOR 1.3V 90MA 9000RPM	~	~	VIBRA_FM_0035_C1
N2030	Top	C	7	TI ANALOG SWITCH TS5A3159DCKR	~	~	PDSO_G6
N2150	Top	G	10	TI ANALOG SWITCH SN74LVC2G66YZTR	~	~	XBGA_N8_H0.625
N2200	Top	F	9	BASEBAND MODULE VILMA 1.04C TFBGA105	~	~	TFBGA_105
N2300	Top	E	13	BETTY V2.1 LF TFBGA64	~	~	TFBGA64_H1.2
N2310	Top	E	13	WHITE LED DRIVER 4LEDS 500MW 8BUMP USMD8	~	~	USMD8_1.69X1.69

Item	Side	Grid ref.		Description and Value			Type
N4200	Top	D	15	MENELAUS1 V2.1 TWL92230 S-PBGA-N80	~	~	PBGA_N80
N4850	Top	G	15	TEMP SENSOR TMP105 12C IF WCSP6	~	~	XBGA_N6_H0.625
N6030	Top	C	12	BTHFM1.0 BALUN ONLY SOLUTION	~	~	LGA_BTHFM_ES3.6
N6300	BTM	F	12	DC/DC CONV TPS6231YZD 1.5V CSP8	~	~	XBGA_N8_2.02X1.02
N6301	BTM	F	13	REG LP3981YDX 2.8/NOPB 0.3A LLP-6	~	2.8V	LLP_6
N6302	BTM	C	13	WLAN MOD LBWA19EBE6-068	~	~	LBWA19EBE6
N6303	BTM	E	12	REG MIC5319YML 500MA ADJ	~	ADJ	MLF_6
N7501	Top	G	6	RF SYSTEM MODULE PIHI2.22 9.0X9.0X1	~	~	TFBGA_188
N7502	Top	G	3	PA RF9282E6.3 GSM/EDGE 850/900/1800/1900	~	~	RF9282E3.6
N7503	Top	E	3	PA MODULE RF9372E5.2 WCDMA 1850-1980MHZ	~	~	RF9372_H1.5
N7504	Top	E	4	DC CONV LM3202TLX NOPB REVB USMD8	~	~	uBGA8_1.849X1.696
N8701	BTM	H	12	REG LP3981YDX-3.0 LLP3	~	3V	LLP_6
N8702	BTM	H	13	VREG LP3985ITLX-3.0 NOPB USMD5	~	3V	USMD5_1.47X1.04_H0.675
N8703	BTM	I	13	VREG LP3985ITLX-3.0 NOPB USMD5	~	3V	USMD5_1.47X1.04_H0.675
R2007	Top	C	8	ASIP USB2 FILTER BGA10**PBFREE**	~	~	uBGA_10_1.7X2.05

Item	Side	Grid ref.		Description and Value			Type
R2010	Top	D	5	ASIP TVS BGA4	~	~	BGA4_1.01X1.07
R2040	Top	E	9	Chipres 0W06 100k F 200ppm 0402	100k	~	0402R
R2041	Top	E	9	Chipres 0W06 100k F 200ppm 0402	100k	~	0402R
R2042	Top	E	9	Chipres 0W06 100k F 200ppm 0402	100k	~	0402R
R2043	Top	E	9	Chipres 0W06 100k F 200ppm 0402	100k	~	0402R
R2046	Top	C	6	CHIP VARISTOR VWM14V VC50V 0402	14V/ 50V	~	0402_VAR
R2051	Top	C	8	Resistor 5% 63mW	220k	~	0402R
R2061	Top	I	15	Resistor 5% 63mW	68R	~	0603R
R2062	Top	I	16	CHIPRES 0W06 2R2 J 0402	2R2	~	0402R
R2063	Top	J	15	CHIPRES 0W06 2R2 J 0402	2R2	~	0402R
R2064	Top	D	7	Resistor 5% 63mW	100k	~	0402R
R2065	Top	D	8	Chipres 0W06 jumper 0402	0R	~	0402R
R2066	Top	D	8	Chipres 0W06 jumper 0402	0R	~	0402R
R2070	BTM	D	2	CHIP VARISTOR VWM14V VC50V 0402	14V/ 50V	~	0402_VAR
R2071	Top	G	9	NTC RES 47K J B=4050+-3% 0402	47k	~	0402_NTH5
R2153	BTM	D	16	ASIP SIM INTERFACE **LOW CAP**BGA8	~	~	uBGA8_1.47X1.47
R2154	BTM	G	16	CHIP VARISTOR VWM14V VC50V 0402	14V/ 50V	~	0402_VAR

Item	Side	Grid ref.		Description and Value			Type
R2155	BTM	G	16	CHIP VARISTOR VWM14V VC50V 0402	14V/ 50V	~	0402_VAR
R2165	Top	G	10	Resistor 5% 63mW	56k	~	0402R
R2230	Top	E	8	Resistor 5% 63mW	470k	~	0402R
R2231	Top	E	8	Resistor 5% 63mW	100k	~	0402R
R2304	BTM	D	15	Resistor 5% 63mW	1k0	~	0402R
R2305	BTM	D	15	Resistor 5% 63mW	47R	~	0402R
R2359	BTM	D	15	Resistor 5% 63mW	100k	~	0402R
R2360	BTM	D	14	Resistor 5% 63mW	1k0	~	0402R
R2375	BTM	E	14	CHIPRES 0W1 120R J 0805	120R	~	0805R
R2376	BTM	D	14	CHIPRES 0W1 120R J 0805	120R	~	0805R
R2381	BTM	D	15	Resistor 5% 63mW	1k0	~	0402R
R2382	BTM	D	15	Resistor 5% 63mW	1k0	~	0402R
R2385	Top	E	13	Resistor 5% 63mW	33R	~	0402R
R2800	Top	H	9	Resistor 5% 63mW	10R	~	0402R
R2903	Top	I	10	Resistor 5% 63mW	4k7	~	0402R
R2930	Top	G	9	Resistor 5% 63mW	4k7	~	0402R
R2931	Top	H	9	Resistor 5% 63mW	4k7	~	0402R
R4800	Top	F	13	Resistor 5% 63mW	10R	~	0402R
R4801	Top	H	15	Resistor 5% 63mW	2k2	~	0402R
R4802	Top	H	15	Resistor 5% 63mW	2k2	~	0402R

Item	Side	Grid ref.		Description and Value			Type
R4804	BTM	F	15	Resistor 5% 63mW	470k	~	0402R
R5002	Top	I	11	Resistor 5% 63mW	100k	~	0402R
R5004	Top	J	12	Resistor 5% 63mW	100k	~	0402R
R5050	Top	F	12	Resistor 5% 63mW	100k	~	0402R
R5060	Top	J	12	Resistor 5% 63mW	100k	~	0402R
R5063	Top	J	12	Resistor 5% 63mW	100k	~	0402R
R5250	BTM	C	15	Chipres 0W06 jumper 0402	0R	~	0402R
R5251	BTM	C	15	CHIP VARISTOR VWM14V VC50V 0402	14V/50V	~	0402_VAR
R6109	Top	D	11	FERRITE BEAD 0R5 600R/100MHZ 0603	600R/100MHz	~	0603_BLM
R6120	Top	C	11	FERRITE BEAD 0R5 600R/100MHZ 0603	600R/100MHz	~	0603_BLM
R6121	Top	C	13	FERRITE BEAD 0R5 600R/100MHZ 0603	600R/100MHz	~	0603_BLM
R6162	Top	C	11	Resistor 5% 63mW	100k	~	0402R
R6190	Top	E	5	Resistor 5% 63mW	47R	~	0402R
R6191	Top	E	6	Resistor 5% 63mW	15k	~	0402R
R6192	Top	E	6	Resistor 5% 63mW	33k	~	0402R
R6194	Top	E	6	Resistor 5% 63mW	1k0	~	0402R
R6196	Top	D	11	Resistor 5% 63mW	220R	~	0402R
R6302	BTM	G	12	Resistor 5% 63mW	1M0	~	0402R

Item	Side	Grid ref.		Description and Value			Type
R6303	BTM	E	13	CHIPRES 0W06 150K F 200PPM 0402	150k	~	0402R
R6304	BTM	E	12	CHIPRES 0W06 270K F 200PPM 0402	270k	~	0402R
R6305	BTM	E	12	Resistor 1% 63mW	12k	~	0402R
R6306	BTM	G	13	Resistor 5% 63mW	1M0	~	0402R
R6406	BTM	F	12	CHIPRES JUMPER 0603	0R	~	0603R
R6450	BTM	D	12	Resistor 5% 63mW	10k	~	0402R
R6461	BTM	D	14	Chipres 0W06 jumper 0402	0R	~	0402R
R6482	BTM	B	11	Chipres 0W06 jumper 0402	0R	~	0402R
R6483	BTM	G	13	Chipres 0W06 jumper 0402	0R	~	0402R
R7504	Top	F	5	CHIPRES 0W06 27K F 0402	27k	~	0402R
R7505	Top	F	5	CHIPRES 0W06 47K D 50PPM 0402	47k	~	0402R
R7509	Top	F	5	Chipres 0W06 jumper 0402	0R	~	0402R
R7510	Top	F	5	Resistor 5% 63mW	10k	~	0402R
R7512	Top	J	7	Resistor 5% 63mW	22k	~	0402R
R7513	Top	F	7	Resistor 5% 63mW	4k7	~	0402R
R7516	Top	I	5	Resistor 5% 63mW	560R	~	0402R
R7517	Top	I	5	CHIPRES 0W06 8K2 F 0402	8k2	~	0402R
R7524	Top	E	4	CHIPRES 0W06 1K2 F 250PPM 0402	1k2	~	0402R
R7528	Top	I	5	Chipres 0W06 5R6 J 0402	5R6	~	0402R

Item	Side	Grid ref.		Description and Value			Type
R7600	Top	J	6	CHIPRES 0W06 27K F 0402	27k	~	0402R
R7601	Top	H	7	Chipres 0W06 jumper 0402	0R	~	0402R
R7621	Top	E	4	Resistor 5% 63mW	10R	~	0402R
R7641	Top	H	6	Chipres 0W06 jumper 0402	0R	~	0402R
R7685	Top	F	4	RES NETWORK 0W04 1DB ATT 0404	870R/ 5R77/ 870R	~	0404_RAC10
R8535	BTM	D	17	Chipres 0W06 jumper 0402	0R	~	0402R
R8720	Top	I	16	Resistor 5% 63mW	10k	~	0402R
R8721	Top	I	16	Chipres 0W06 jumper 0402	0R	~	0402R
R8723	Top	I	16	CHIPRES 0W125 10R F 0805	10R	~	0805R
R8724	BTM	E	15	Resistor 5% 63mW	270R	~	0402R
R8726	BTM	E	15	Resistor 5% 63mW	1k5	~	0402R
R8727	BTM	E	15	Resistor 5% 63mW	82R	~	0402R
R8728	BTM	H	15	Resistor 5% 63mW	4k7	~	0402R
R8729	BTM	H	15	Resistor 5% 63mW	4k7	~	0402R
R8732	Top	J	12	Chipres 0W06 100R F 200ppm 0402	100R	~	0402R
R8733	Top	J	12	Chipres 0W06 100R F 200ppm 0402	100R	~	0402R
R8734	BTM	I	15	Chipres 0W06 jumper 0402	0R	~	0402R
R8748	BTM	H	15	Resistor 5% 63mW	100k	~	0402R
R8749	BTM	F	15	Resistor 5% 63mW	10R	~	0402R

Item	Side	Grid ref.		Description and Value			Type
R8800	BTM	C	16	Resistor 5% 63mW	100k	~	0402R
R8902	BTM	G	15	Resistor 5% 63mW	100k	~	0402R
R8903	BTM	G	15	Resistor 5% 63mW	100k	~	0402R
R8907	BTM	F	15	Chipres 0W06 jumper 0402	0R	~	0402R
R8908	BTM	F	15	Chipres 0W06 jumper 0402	0R	~	0402R
R8909	BTM	F	15	Chipres 0W06 jumper 0402	0R	~	0402R
R8928	Top	E	9	Chipres 0W06 jumper 0402	0R	~	0402R
R8929	Top	E	9	Chipres 0W06 jumper 0402	0R	~	0402R
R8941	BTM	F	17	Resistor 5% 63mW	10k	~	0402R
R8942	BTM	F	17	Resistor 5% 63mW	10k	~	0402R
T7501	Top	F	6	TRANSF BALUN 2134+-90MHZ 0805	~	~	TRANS_LDB15
T7502	Top	I	6	TRANSF BALUN 3800+-550MHZ 0805	~	~	TRANS_LDB15
V2302	BTM	D	15	TRX2 BIPOLAR 2XPNP 40V 0A1 0W12 SOT666	~	~	SOT_666
V2350	BTM	F	16	TR DTC143ZM N RB=4K7 RBE=47K VMT3	~	~	VMT3_R
V2354	BTM	D	14	TR 2SC5658QRS N 50V 0A1 0W15 VMT3	~	~	VMT3
V2356	BTM	E	15	MOSFET N 30V 100MA VMT3	~	~	VMT3_R
V2357	BTM	E	14	MOSFET N 30V 100MA VMT3	~	~	VMT3_R
V2381	BTM	D	15	TRX2 BIPOLAR 2XPNP 40V 0A1 0W12 SOT666	~	~	SOT_666

Item	Side	Grid ref.		Description and Value			Type
V6300	BTM	G	13	SCH DI 1PS79SB31 200MA 30V SOD523	~	~	SC79
V6301	BTM	G	13	SCH DI 1PS79SB31 200MA 30V SOD523	~	~	SC79
V8720	BTM	E	15	TR 2SC5658QRS N 50V 0A1 0W15 VMT3	~	~	VMT3
V8725	Top	G	16	MFET 2SK402900L 25V 1A 0.55R SMINI2-G1	~	~	SMINI_3
V8726	Top	G	16	SCH DI MA21D35 30V/1A VF=0.49V/1A	~	~	SMINI_2_F2_TUMD2
V8735	Top	E	6	Tr NPN 12V 35mA SOT323	~	~	SOT323
X2001	Top	B	7	SM SYST.CONN 14 POL MINI POP-PORT	~	~	SYSCON_RSD_MINIPOP
X2060	BTM	B	16	MODULE ID COMPONENT 2.8X1.8X0.3	~	~	TRACEABILITY_PAD
X2070	BTM	F	2	SM BATTERY CONN 3POLE SPR	~	~	CONN_CY_5225_1817H
X6402	BTM	B	8	C-SPRING ANTENNA active	~	~	SPRING_WN9149_N10
X6403	BTM	B	7	C-SPRING ANTENNA active	~	~	SPRING_WN9149_N10
X6405	BTM	B	11	SM CONN RF JACK 50R 2W 6GHZ	~	~	RF_SWITCH_MS_156
X7600	BTM	H	2	C-SPRING ANTENNA active	~	~	SPRING_WN9149_N10
X7601	BTM	G	2	SM CONN RF JACK 50R 2W 6GHZ	~	~	RF_SWITCH_MS_156
X7602	BTM	D	2	SM CONN RF JACK 50R 2W 6GHZ	~	~	RF_SWITCH_MS_156
X7603	BTM	C	2	C-SPRING ANTENNA active	~	~	SPRING_WN9149_N10
X7605	BTM	I	2	C-SPRING ANTENNA active	~	~	SPRING_WN9149_N10
X8520	BTM	E	16	SM CONN B2B 2X25 F P0.4	~	~	MOLEX_51338_0503

Item	Side	Grid ref.		Description and Value			Type
X8600	BTM	C	15	SM CONN 2X10 F P0.4 PCB/PCB	~	~	JST_C03_00539_20P
X8900	BTM	H	16	CONN COAX 25PIN RECEPT 50V 0.3A	~	~	CON_JAE_FI_J25S_VF15
X8901	BTM	G	14	CONN COAX 40PIN RECEPT VERTICAL 50V 0.3A	~	~	CON_JAE_FI_J40S_VF15
Z2000	Top	C	8	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R/ 100M Hz	~	FERRITE_0402
Z2001	Top	C	8	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R/ 100M Hz	~	FERRITE_0402
Z2003	Top	C	8	FERRITE BEAD 0.6R 600R/100MHZ 0402	600R/ 100M Hz	~	FERRITE_0402
Z2030	Top	D	6	ASIP 4 LINES AUDIO FILTER BGA11	~	~	BGA11
Z5200	Top	C	15	HIGH SPEED MMC ASIP	~	~	FLIP_CHIP_16_2.01X2.02_ H0.715
Z7501	Top	D	3	DUPL BAW 1920-1980/2110-2170MHZ 3.8X3.8	1920-1980/ 2110-2170M HZ	~	P_TC3N_12_1_AGI
Z7503	Top	J	4	TX SAW MODULE GSM 850/900MHZ	850/9 00MHz	~	MODULE_SP_LMZ_137
Z7600	Top	F	4	CER FILT LFL181699TC1 2400-2480MHZ 1.6	2400-2483M Hz	~	FILTER_LFTC10N
Z8801	BTM	D	16	ASIP 10-CH ESD EMI FILTER BGA25	~	~	uBGA25_2.47X2.47
Z8802	BTM	C	16	ASIP 10-CH ESD EMI FILTER BGA25	~	~	uBGA25_2.47X2.47
Z8900	BTM	H	17	ASIP 10-CH ESD EMI FILTER BGA25	~	~	uBGA25_2.47X2.47
Z8901	BTM	G	17	ASIP 10-CH ESD EMI FILTER BGA25	~	~	uBGA25_2.47X2.47
Z8902	BTM	G	15	ASIP 10-CH ESD EMI FILTER BGA25	~	~	uBGA25_2.47X2.47

Item	Side	Grid ref.		Description and Value			Type
Z9064	BTM	D	14	ASIP 4XESD **PB-FREE** BGA5	~	~	uBGA5

Component layouts

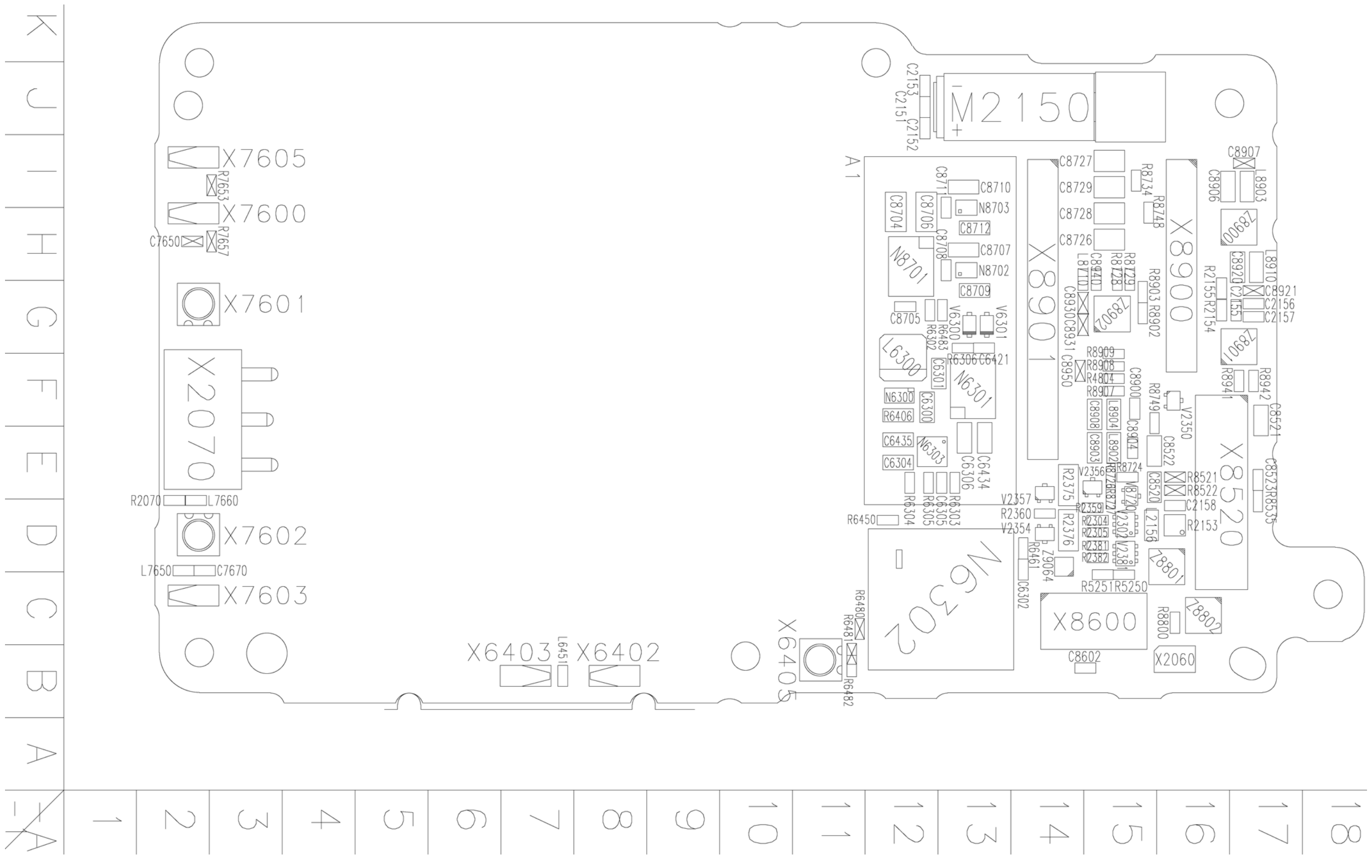

K
J
I
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
X7605
X7600
X7601
X2070
X7602
X7603
X6403
X6402
X6405
M2150
X8901
X8900
X8520
X8600
X2060
N6302
N6301
N8701
L6300
A1

Figure 2 Component layout - bottom view (1LD_040)

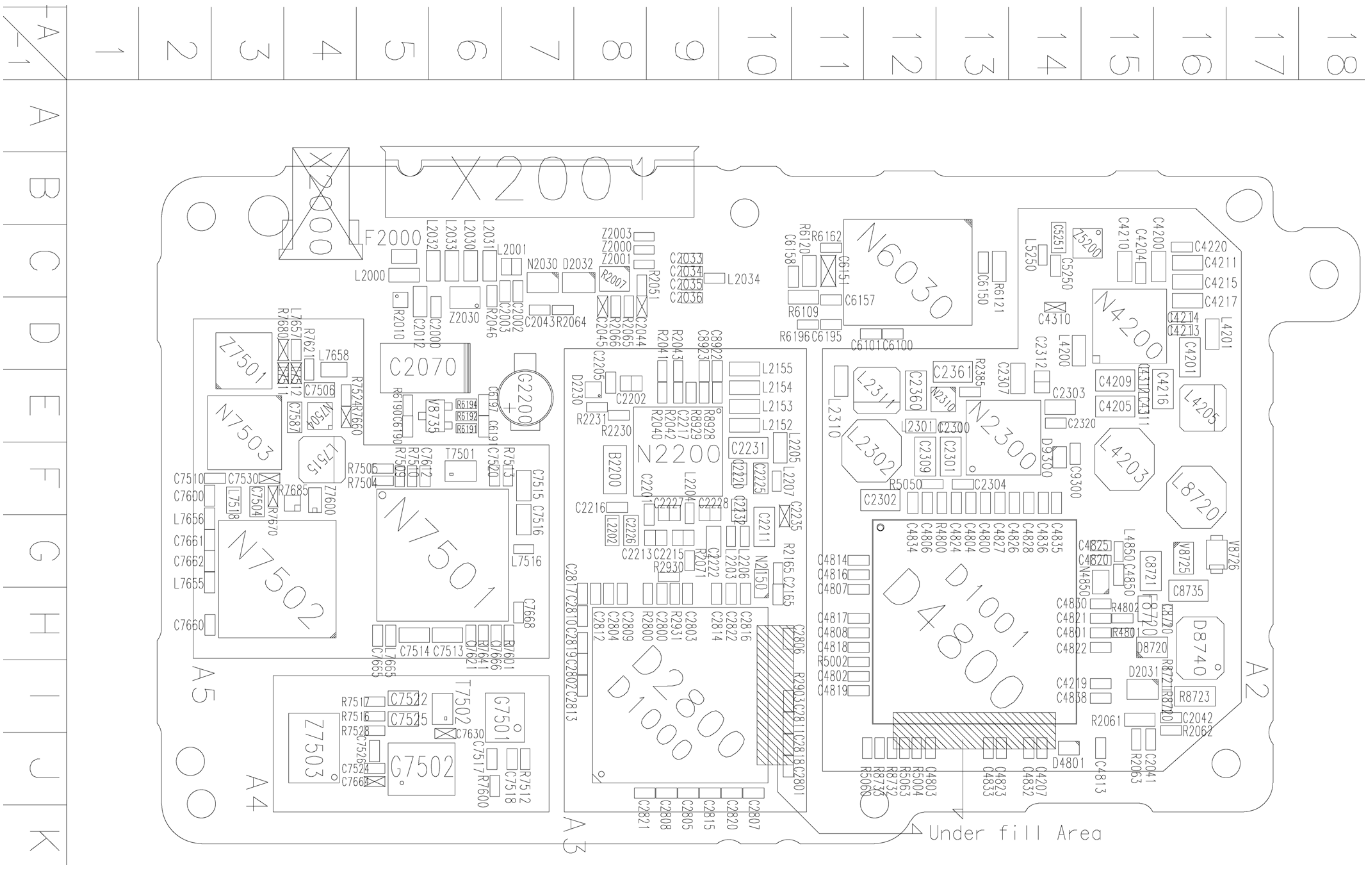

A1
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
A
B
C
D
E
F
G
H
I
J
K
X2001
X2000
F2000
N6030
N4200
C2070
G2200
Z7501
N7503
L7515
N7501
N7502
N2200
B2200
N2300
L2302
L2311
L4203
L4205
L8720
D1001
D4800
D2800
D1000
D8740
Z7503
T7502
G7501
G7502
A2
A3
A4
A5
Under fill Area

Figure 3 Component layout - top view (1LD_040)

3 — Phoenix Service Software Instructions

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Phoenix installation steps in brief

Prerequisites

Recommended hardware requirements:

- Computer processor: Pentium 700 MHz or higher
- RAM 256 MB
- Disk space 100-300 MB

Supported operating systems:

- *Windows 2000* Service Pack 3 or higher
- *Windows XP* Service Pack 1 or higher

Context

Phoenix is a service software for reprogramming, testing and tuning phones.

Phoenix installation contains:

- Service software support for all phone models included in the package
- Flash update package files for programming devices
- All needed drivers for:
  - PKD-1 (DK2) dongle
  - DKU-2 USB cable

Note: Separate installation packages for flash update files and drivers are also available, but it is not necessary to use them unless there are updates between *Phoenix* service software releases. If separate update packages are used, they should be used after *Phoenix* and data packages have been installed.

The phone model specific data package includes all changing product specific data:

- Product software binary files
- Files for type label printing
- Validation file for the faultlog repair data reporting system
- All product specific configuration files for *Phoenix* software components

Note: *Phoenix* and phone data packages should only be used as complete installation packages. Uninstallation should be made from the *Windows* Control Panel.

To use *Phoenix*, you need to:

Steps

1. Connect a PKD-1 (DK2) dongle to the computer parallel port.
2. Install *Phoenix*.
3. Install the phone-specific data package.
4. Configure users.
5. Manage connection settings (depends on the tools you are using).
   - Update FPS-10 software

     Note: There is no need to activate FPS-10.
   - Activate SX-4 smart card, if you need tuning and testing functions.

     Note: When FPS-10 is used only for product software updates, SX-4 smart card is not needed.

Results

Phoenix is ready to be used with FPS-10 flash prommer and other service tools.

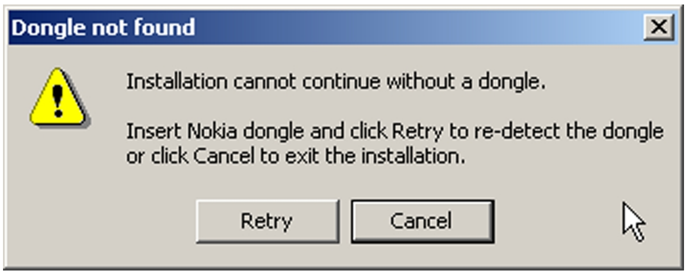
Installing *Phoenix*

Prerequisites

- Check that a dongle is attached to the parallel port of your computer.
- Download the *Phoenix* installation package (for example, *phoenix_service_sw_2004_39_x_xx.exe*) to your computer (in *C:|TEMP*, for instance).
- Close all other programs.
- Depending on your operating system, administrator rights may be required to install *Phoenix*.
- If uninstalling or rebooting is needed at any point, you will be prompted by the InstallShield program.

Context

At some point during the installation procedure, you may get the following message:


Dongle not found

Installation cannot continue without a dongle.

Insert Nokia dongle and click Retry to re-detect the dongle or click Cancel to exit the installation.

Figure 4 Dongle not found

This may be a result of a defective or too old PKD-1 dongle.

Check the COM/parallel ports used. After correcting the problem, you can restart the installation.

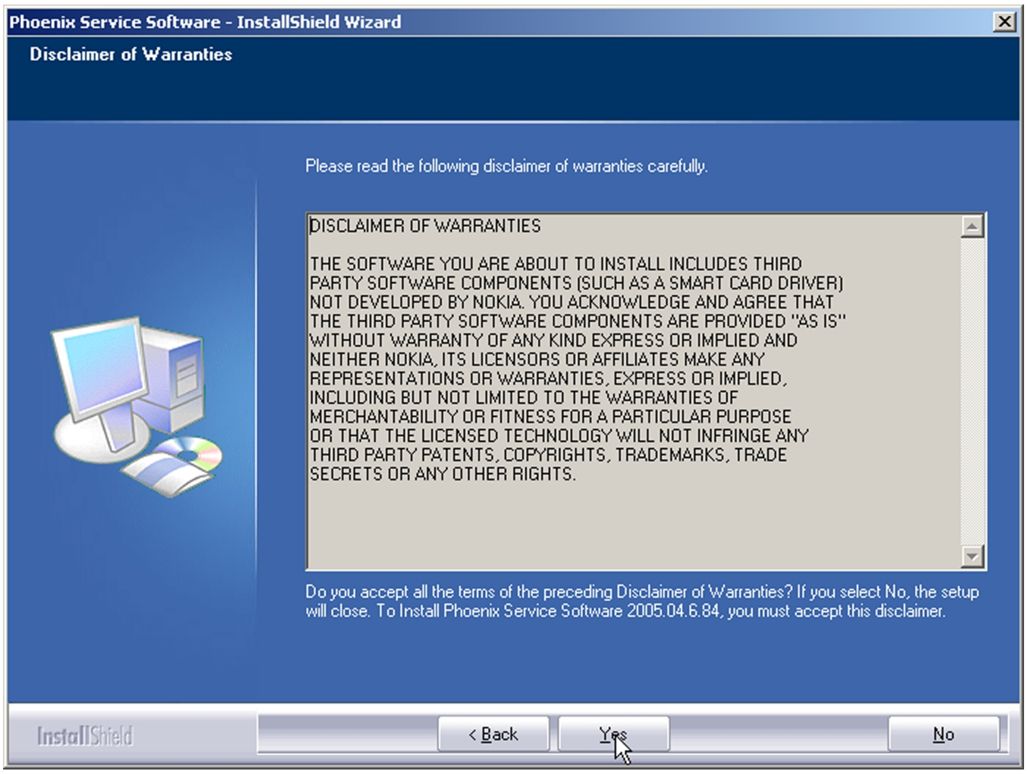
For more detailed information, please refer to *Phoenix* Help files.

> **Tip:** Each feature in *Phoenix* has its own Help function, which can be activated while running the program. Press the **F1** key or the feature's **Help** button to activate a Help file.

Steps

1. To start the installation, run the application file (for example,*phoenix_service_sw_2004_39_x_xx.exe*).
2. In the *Welcome* dialogue, click **Next**.

3. Read the disclaimer text carefully and click **Yes**.



Please read the following disclaimer of warranties carefully.

DISCLAIMER OF WARRANTIES

THE SOFTWARE YOU ARE ABOUT TO INSTALL INCLUDES THIRD PARTY SOFTWARE COMPONENTS (SUCH AS A SMART CARD DRIVER) NOT DEVELOPED BY NOKIA. YOU ACKNOWLEDGE AND AGREE THAT THE THIRD PARTY SOFTWARE COMPONENTS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND EXPRESS OR IMPLIED AND NEITHER NOKIA, ITS LICENSORS OR AFFILIATES MAKE ANY REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR THAT THE LICENSED TECHNOLOGY WILL NOT INFRINGE ANY THIRD PARTY PATENTS, COPYRIGHTS, TRADEMARKS, TRADE SECRETS OR ANY OTHER RIGHTS.

Do you accept all the terms of the preceding Disclaimer of Warranties? If you select No, the setup will close. To Install Phoenix Service Software 2005.04.6.84, you must accept this disclaimer.

Figure 5 Disclaimer text

4. Choose the destination folder.

   The default folder *C:|ProgramFiles|Nokia|Phoenix* is recommended.
5. To continue, click **Next.**

   To choose another location, click **Browse** (not recommended).
6. Wait for the components to be copied.

   The progress of the installation is shown in the *Setup Status* window.
7. Wait for the drivers to be installed and updated.

   The process may take several minutes to complete.

   If the operating system does not require rebooting, the PC components are registered right away.

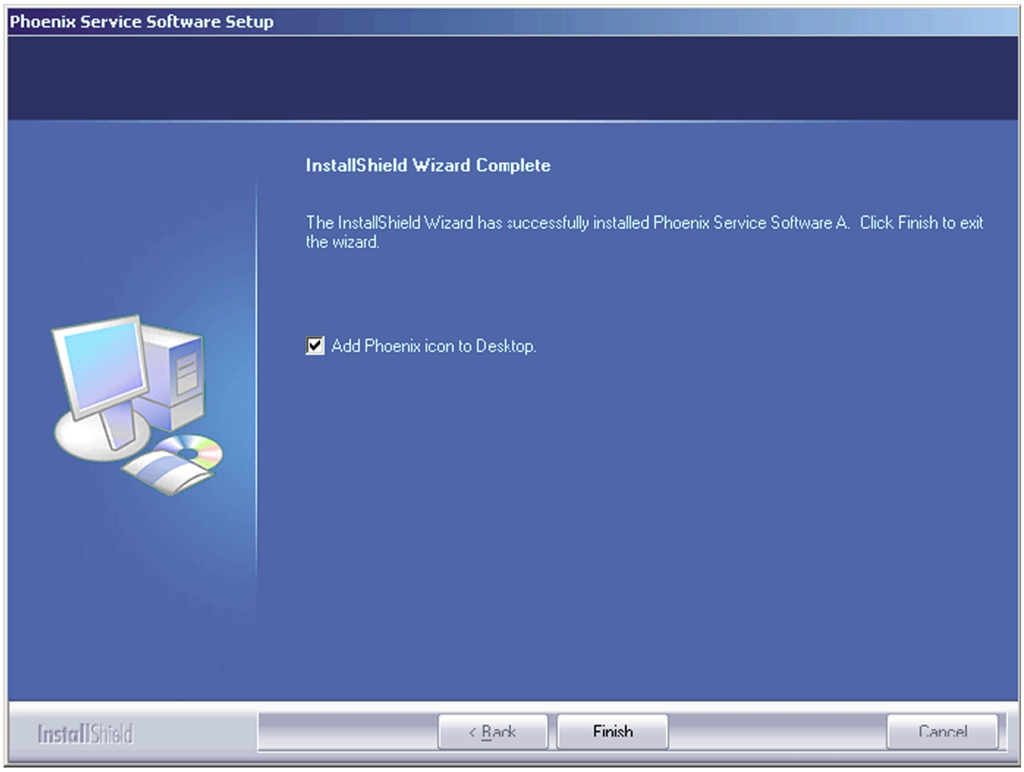
   If the operating system requires restarting your computer, the Install Shield Wizard will notifies about it.

   Select **Yes...** to reboot the PC immediately or **No...** to reboot the PC manually afterwards.

   After the reboot, all components are registered.

   Note: *Phoenix* does not work, if the components have not been registered.

8. To end the installation, click **Finish**.



Phoenix Service Software Setup

InstallShield Wizard Complete

The InstallShield Wizard has successfully installed Phoenix Service Software A. Click Finish to exit the wizard.

☑ Add Phoenix icon to Desktop.

Figure 6 InstallShield Wizard Complete

Next actions

After the installation, *Phoenix* can be used after:

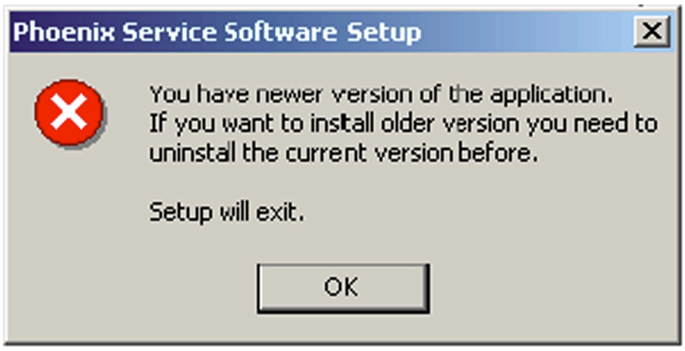
- installing phone model specific data package for *Phoenix*
- configuring users and connections

FPS-10 flash prommer can be used after updating their flash update package files.

Updating *Phoenix* installation

Context

- If you already have the *Phoenix* service software installed on your computer, you need to update the software when new versions are released.
- To update *Phoenix*, you need to follow the same steps as when installing it for the first time.
- When you are updating, for example, from version **a14_2004_16_4_47** to **a15_2004_24_7_55**, the update will take place automatically without uninstallation.
- Always use the latest available versions of both *Phoenix* and the phone-specific data package. Instructions can be found in the phone model specific Technical Bulletins and phone data package *readme.txt* files (shown during installation).
- If you try to update *Phoenix* with the same version you already have (for example, **a15_2004_24_7_55** to **a15_2004_24_7_55**), you are asked if you want to uninstall the existing version. In this case you can choose between a total uninstallation or a repair installation in a similar way when choosing to uninstall the application from the *Windows* Control Panel.
- If you try to install an older version (for example, downgrade from **a15_2004_24_7_55** to **a14_2004_16_4_47**), installation will be interrupted.



You have newer version of the application.
If you want to install older version you need to uninstall the current version before.

Setup will exit.

Figure 7 Installation interrupted

- Always follow the instructions on the screen.

Steps

1. Download the installation package to your computer hard disk.
2. Close all other programs.
3. Run the application file (for example, *phoenix_service_sw_2004_39_x_xx.exe*).

Results

A new *Phoenix* version is installed and driver versions are checked and updated.

Uninstalling *Phoenix*

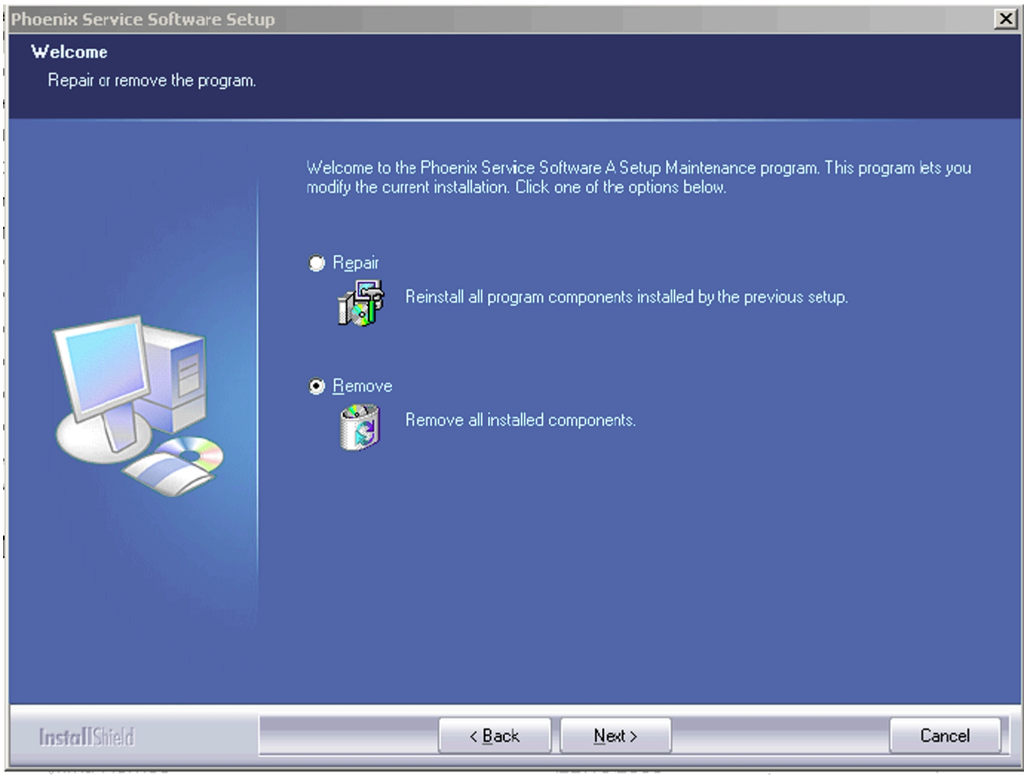
Context

You can uninstall *Phoenix* service software manually from the *Windows* Control Panel.

Steps

1. Open the **Windows Control Panel**, and choose **Add/Remove Programs**.

2. To uninstall *Phoenix*, choose **Phoenix Service Software→Change/Remove→Remove** .



Phoenix Service Software Setup
InstallShield
< Back
Next >
Cancel

Welcome

Repair or remove the program.

Welcome to the Phoenix Service Software A Setup Maintenance program. This program lets you modify the current installation. Click one of the options below.

○ Repair

Reinstall all program components installed by the previous setup.

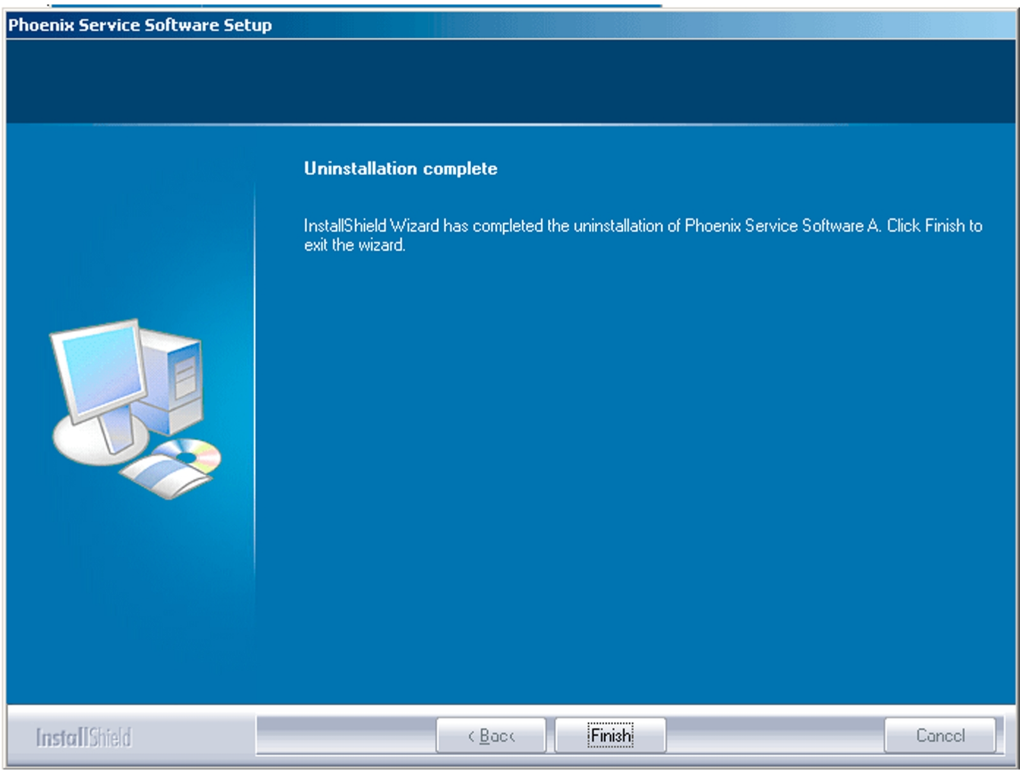
● Remove

Remove all installed components.

Figure 8 Remove program

The progress of the uninstallation is shown.

3. If the operating system does not require rebooting, click **Finish** to complete.



Phoenix Service Software Setup
InstallShield
< Back
Finish
Cancel

Uninstallation complete

InstallShield Wizard has completed the uninstallation of Phoenix Service Software A. Click Finish to exit the wizard.

Figure 9 Finish uninstallation

If the operating system requires rebooting, InstallShield Wizard will notify you. Select **Yes...** to reboot the PC immediately and **No...** to reboot the PC manually afterwards.

Repairing *Phoenix* installation

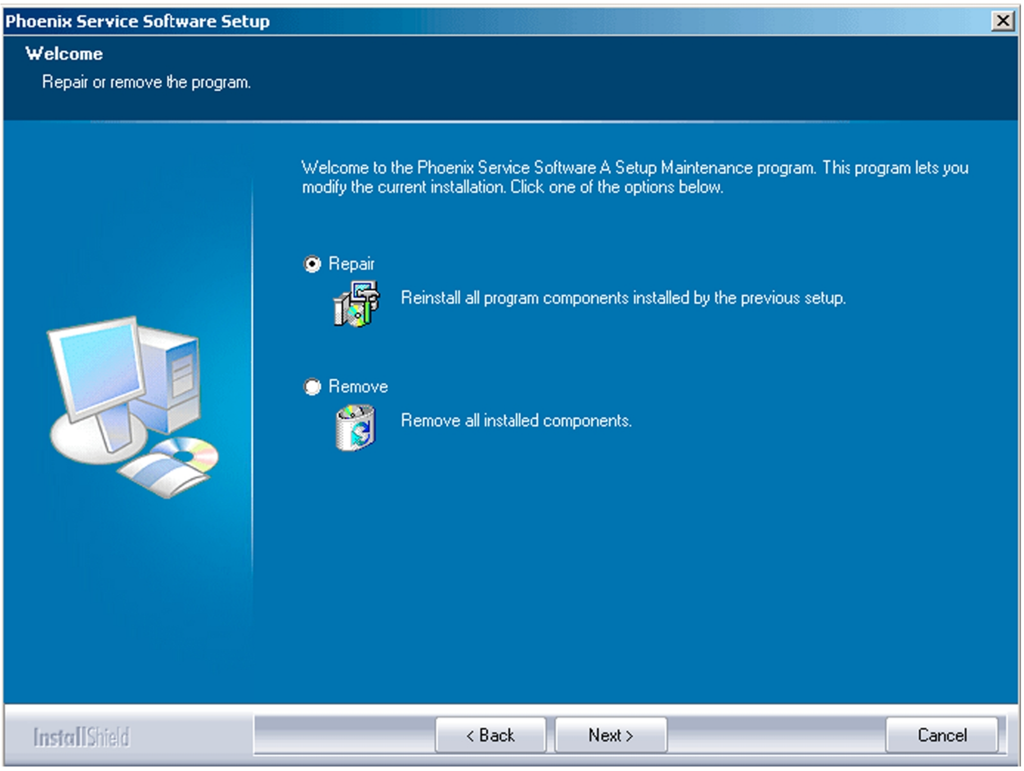
Context

If you experience any problems with the service software or suspect that files have been lost, use the repair function before completely reinstalling *Phoenix*.

> **Note:** The original installation package (for example, *phoenix_service_sw_a15_2004_24_7_55.exe*) must be found on your PC when you run the repair setup.

Steps

1. Open **Windows Control Panel→Add/Remove Programs** .
2. Choose **Phoenix Service Software→Change/Remove** .
3. In the following view, select **Repair**.



Phoenix Service Software Setup

Welcome

Repair or remove the program.

Welcome to the Phoenix Service Software A Setup Maintenance program. This program lets you modify the current installation. Click one of the options below.

● Repair

Reinstall all program components installed by the previous setup.

○ Remove

Remove all installed components.

Figure 10 Repair program

Phoenix reinstalls components and registers them.

The procedure is the same as when updating *Phoenix*.

4. To complete the repair, click **Finish**.

Phone data package overview

Each product has its own data package (DP). The product data package contains all product-specific data files to make the Phoenix service software and tools usable with a certain phone model.

The phone data package contains the following:

- Product software binary files

- Files for type label printing
- Validation file for the fault log repair data reporting system
- All product-specific configuration files for Phoenix software components

Data files are stored in **C:\Program Files\Nokia\Phoenix** (default).

Installing phone data package

Prerequisites

- A phone-specific data package contains all data required for the *Phoenix* service software and service tools to be used with a certain phone model.
- Check that a dongle is attached to the parallel port of your computer.
- Install *Phoenix* service software.
- Download the installation package (for example, *XX-XX_dp_EA_v_1_0.exe*) to your computer (for example, in C:\TEMP).
- Close all other programs.

(XX-XX = type designator of the product)

If you already have *Phoenix* installed on your computer, you will need to update it when a new version is released.

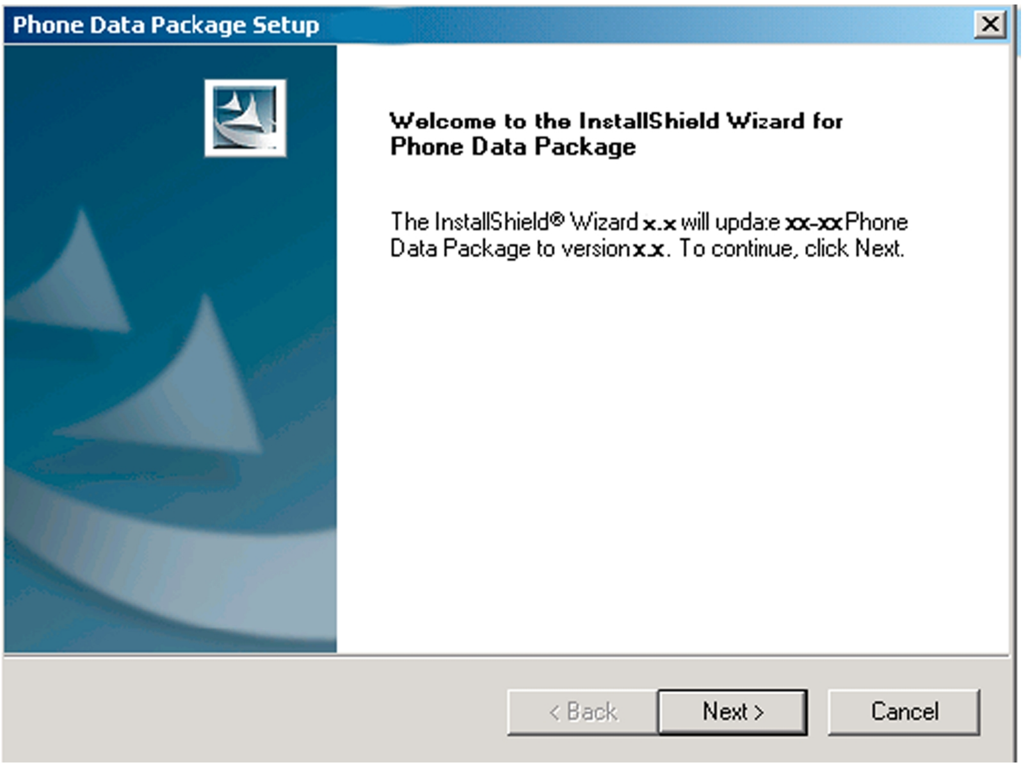
> **Note:** Often *Phoenix* and the phone-specific data package come in pairs, meaning that a certain version of *Phoenix* can only be used with a certain version of a data package. Always use the latest available versions of both. Instructions can be found in phone-specific Technical Bulletins and *readme.txt* files of data packages.

Steps

1. To start the installation, run the application file (for example, *XX-XX_dp_EA_ v_1_0.exe*),

   Wait for the installation files to be extracted.

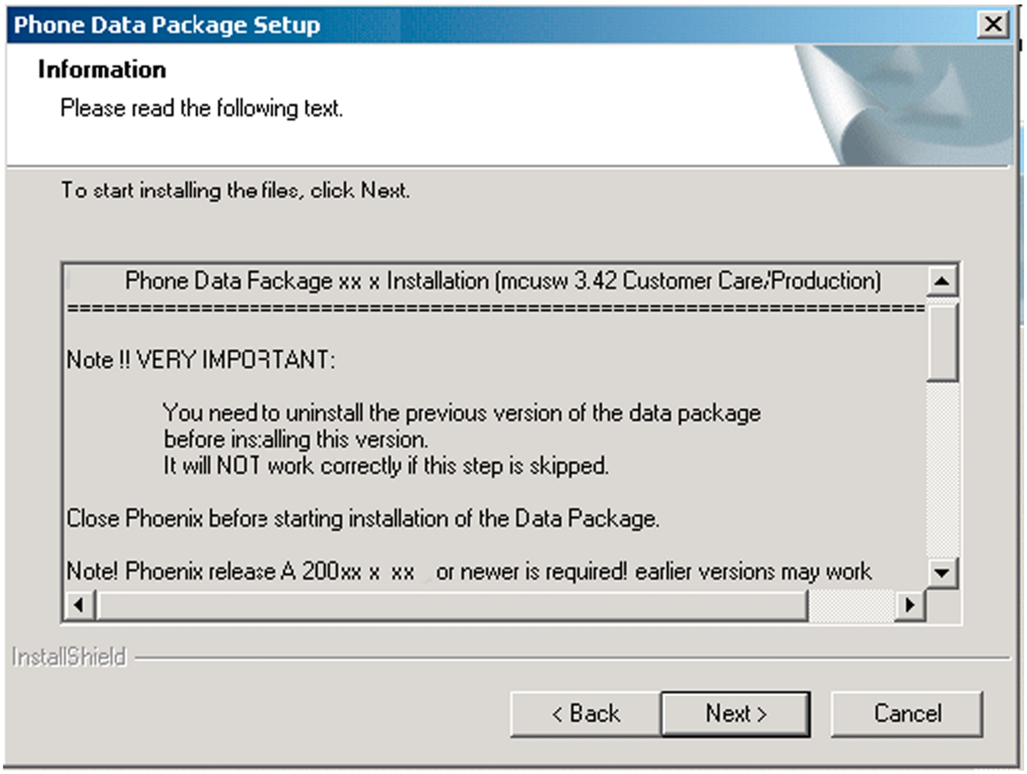
2. Click **Next**.



Welcome to the InstallShield Wizard for Phone Data Package

The InstallShield® Wizard x.x will upda:e xx-xx Phone Data Package to version x.x. To continue, click Next.

3. In the following view you can see the contents of the data package. Read the text carefully. There is information about the *Phoenix* version required with this data package.



Information

Please read the following text.

To start installing the files, click Next.

Phone Data Fackage xx x Installation (mcusw 3.42 Customer Care/Production)
==

Note !! VERY IMPORTANT:

You need to uninstall the previous version of the data package
before ins:alling this version.
It will NOT work correctly if this step is skipped.

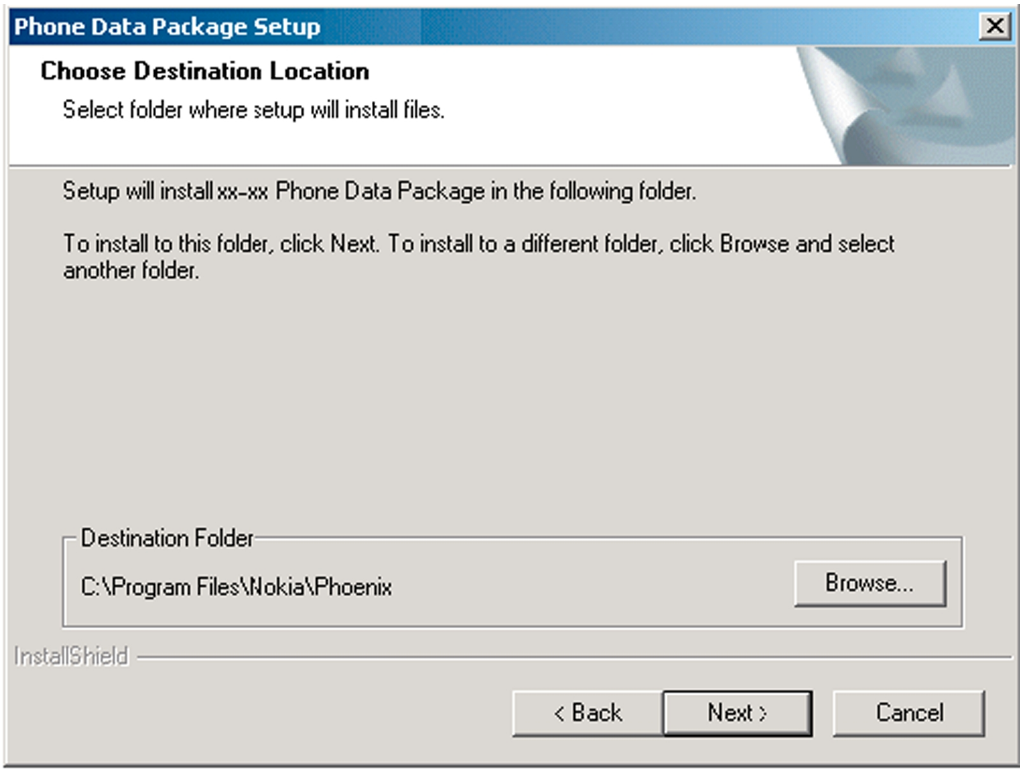
Close Phoenix befor∃ starting installation of the Data Package.

Note! Phoenix release A 200xx x xx or newer is required! earlier versions may work

Figure 11 Data package setup information

4. To continue, click **Next**.

5. Choose the destination folder, and click **Next** to continue.



Phone Data Package Setup

Choose Destination Location

Select folder where setup will install files.

Setup will install xx-xx Phone Data Package in the following folder.

To install to this folder, click Next. To install to a different folder, click Browse and select another folder.

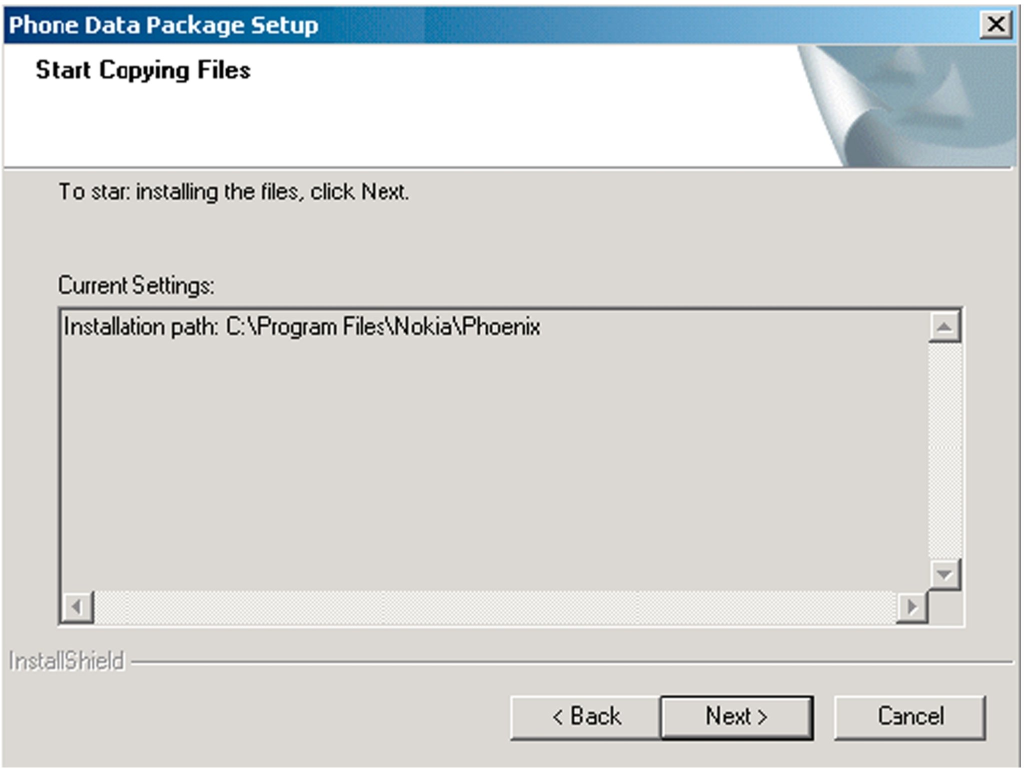
Destination Folder

C:\Program Files\Nokia\Phoenix

Figure 12 Data package destination folder

The InstallShield Wizard checks where *Phoenix* is installed, and the directory is shown.

6. To start copying the files, click **Next**.



Phone Data Package Setup

Start Copying Files

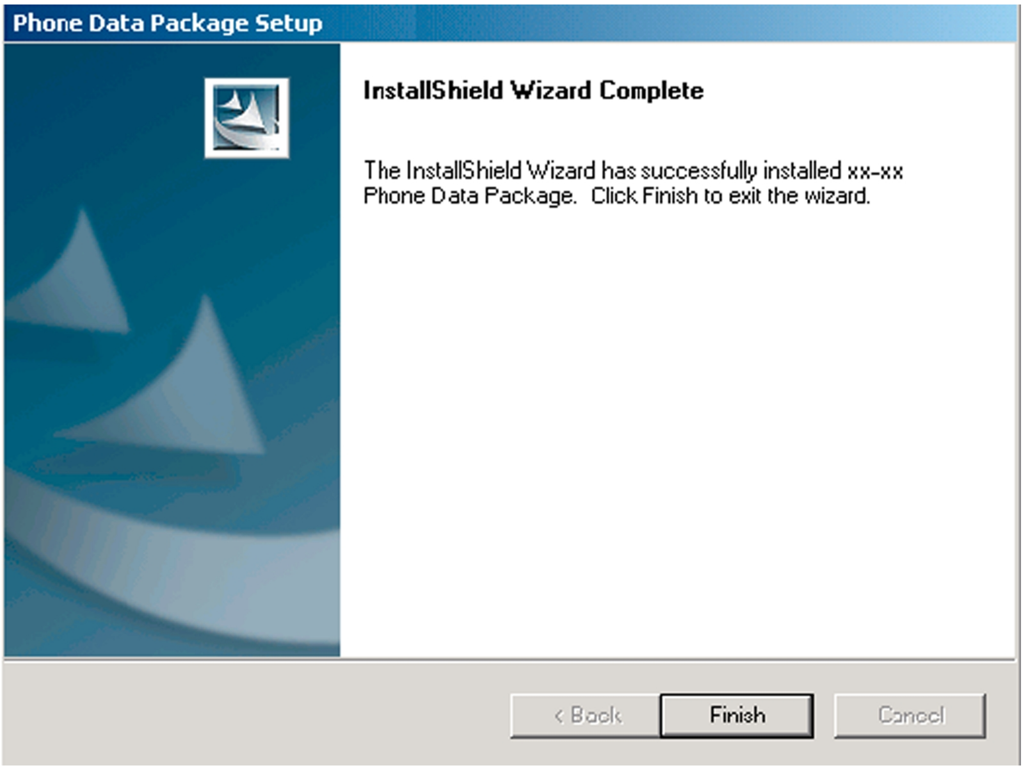
To start installing the files, click Next.

Current Settings:

Installation path: C:\Program Files\Nokia\Phoenix

Phone model specific files are installed. Please wait.

7. To complete the installation, click **Finish**.



Phone Data Package Setup

InstallShield Wizard Complete

The InstallShield Wizard has successfully installed xx-xx Phone Data Package. Click Finish to exit the wizard.

Figure 13 InstallShield Wizard Complete

Next actions

Phoenix can be used for flashing phones and printing type labels after:

- Configuring users
- Managing connections

FPS-10 can be used after updating their flash update package files.

Uninstalling phone data package

Context

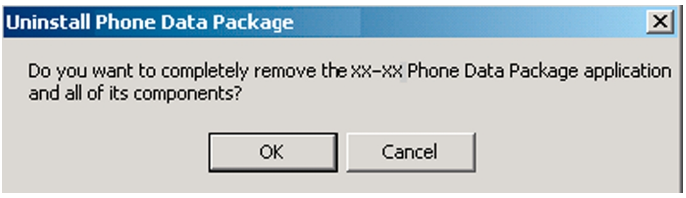
There is no need to uninstall an older version of a data package, unless instructions to do so are given in the *readme.txt* file of the data package and bulletins related to the release.

Please read all related documents carefully.

Steps

1. Locate the data package installation file (e.g. *XX-XX_dp_EA_v_1_0.exe*) from your computer.
2. To start the uninstallation procedure, double-click the data package installation file.

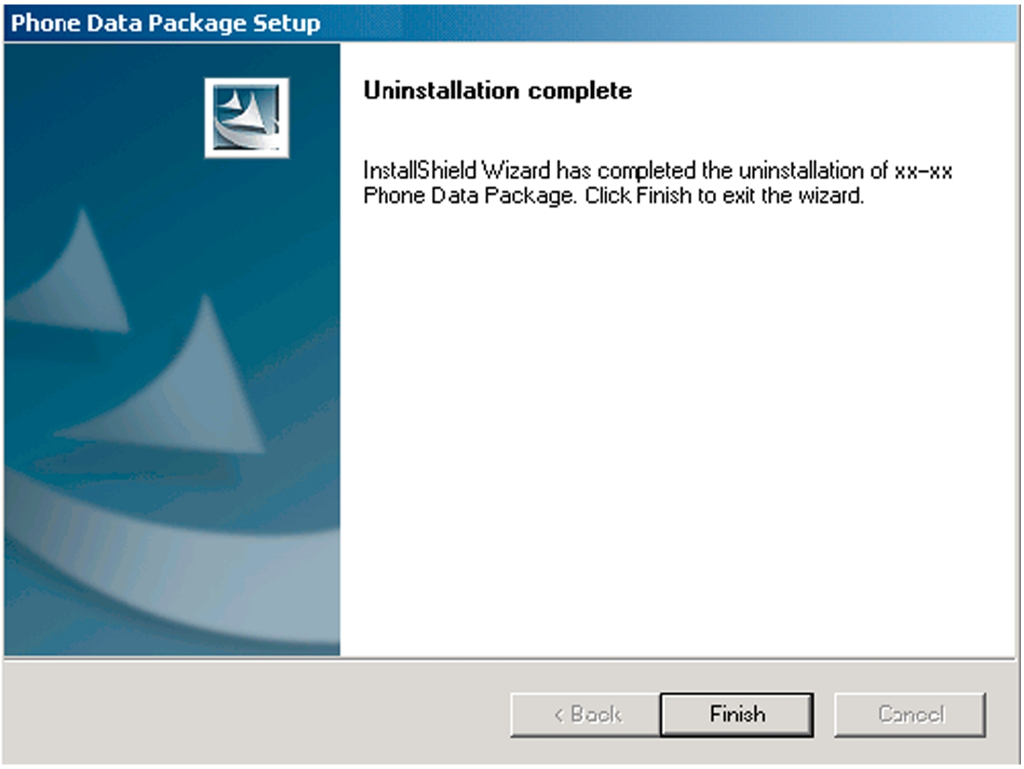
3. To uninstall the data package, click **OK** or to interrupt the uninstallation, click **Cancel**.


Uninstall Phone Data Package
OK
Cancel

Do you want to completely remove the xx-xx Phone Data Package application and all of its components?

Figure 14 Uninstalling phone data package

4. When the data package is uninstalled, click **Finish**.


Phone Data Package Setup
< Back
Finish
Cancel

Uninstallation complete

InstallShield Wizard has completed the uninstallation of xx-xx Phone Data Package. Click Finish to exit the wizard.

Figure 15 Finishing data package uninstallation

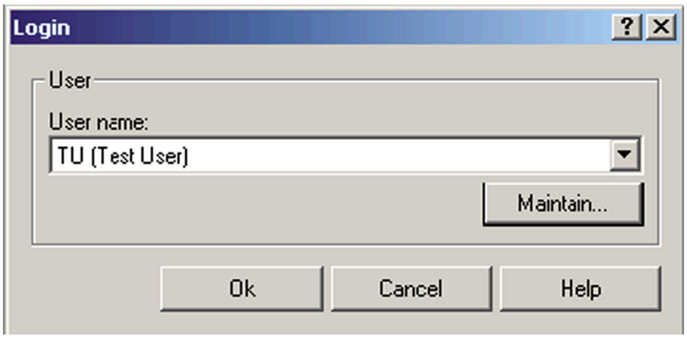
Alternative steps

- You can also uninstall the data package manually from **Control Panel→Add/Remove Programs→xx-xx* Phone Data Package** . (*= type designator of the phone).

Configuring users in *Phoenix*

Steps

1. Start *Phoenix* service software, and log in.



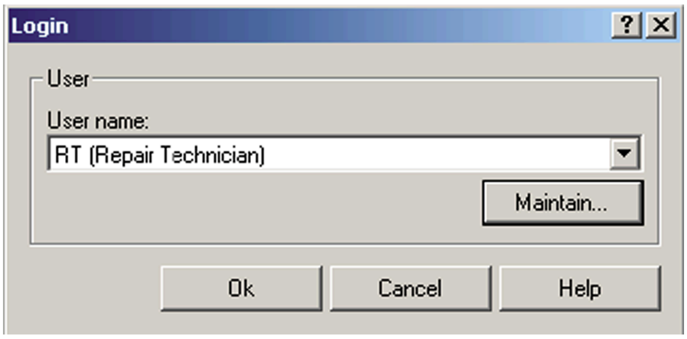
User name: TU (Test User)

Figure 16 Phoenix login

If the user ID is already configured, select s/he from the *User name* drop-down list, and click **OK**.

2. To add a new user, or to edit existing ones, click **Maintain**.
3. To add a new user, click **New**.
4. Type in the name and initials of the user, and click **OK**.

   The user is added to the user name list.
5. Select the desired user from the *User name* drop-down list, and click **OK**.



User name: RT (Repair Technician)

Figure 17 New user configured

Managing connections in *Phoenix*

Context

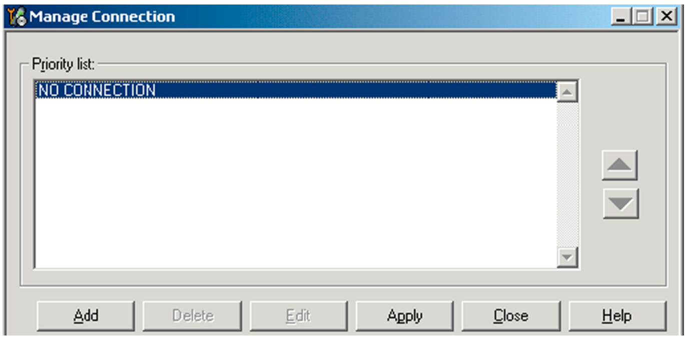
With the **Manage Connections** feature you can edit and delete existing connections or create new ones.

> **Note:** After choosing the desired connection, and connecting the phone to a PC for the first time, allow the PC to install the USB device drivers first. Please note that this may take some time to complete.
>
> If there are problems after the driver installation, check that the USB connection is active from the **Windows Control Panel**. If the problem persists, contact the local PC support.

Steps

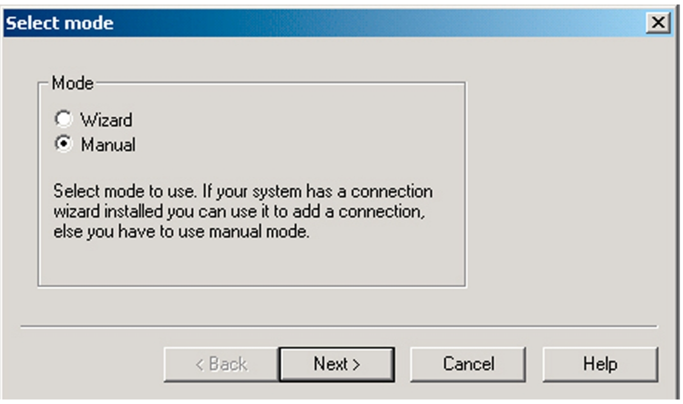
1. Start *Phoenix*, and log in.
2. Choose **File→Manage Connections...** .

3. To add a new connection, click **Add**.



4. Select **Manual** mode, and click **Next** to continue.

   If you want to create the connection using the Connection Wizard, connect the tools and a phone to your PC. The wizard will automatically try to configure the correct connection.



○ Wizard
● Manual

Select mode to use. If your system has a connection wizard installed you can use it to add a connection, else you have to use manual mode.

Figure 18 Select mode: Manual

i For an FPS-10 flash prommer with a **USB Connection**, choose the following connection settings:

- Media: **FPS-10 USB**
- DEVICE_INDEX: **0**
- SERIAL_NUM: See Serial No from the label attached to the bottom of FPS-10
- ACTIVE_MEDIA: **USB**

ii For an FPS-10 flash prommer with a **LAN connection**, choose the following connection settings:

- Media: **FPS-10 TCP/IP**
- NET_SERV_NAME: Click **Scan...**. Choose your own FPS-10 device based on the correct MAC address. See Serial No from the label attached to the bottom of your FPS-10.
- PORT_NUM: Use the default value, and click **Next**.
- PROTOCOL_FAMILY: Use the default value, and click **Next**.
- SOCKET TYPE: Use the default value, and click **Next**.
- TX_BUFFER_SIZE: Use the default value, and click **Next**.
- RX_BUFFER_SIZE: Use the default value, and click **Next**.

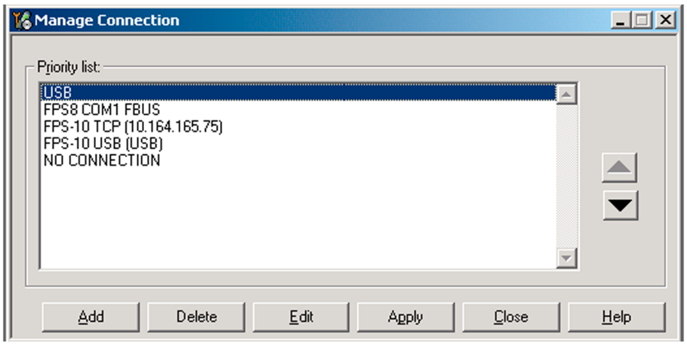
iii For a plain **USB connection**, choose the following connection settings:

Note: First connect the DKU-2 USB cable between the PC USB port and phone.

- Media: USB

5. To complete the configuration, click **Finish**.

6. Click the connection you want to activate. Use the up/down arrows located on the right hand side to move it on top of the list, then click **Apply**.



USB
FPS8 COM1 FBUS
FPS-10 TCP (10.164.165.75)
FPS-10 USB (USB)
NO CONNECTION

Figure 19 Connections list

The connection is activated, and it can be used after closing the *Manage Connection* window.

The connection information is shown at the right hand bottom corner of the screen.

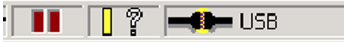
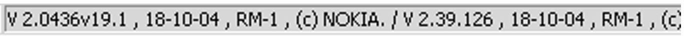


Figure 20 Connection information

7. To use the connection, connect the phone to your PC with correct service tools. Make sure the phone is switched on, and then choose **File→Scan Product** .

Results

The product support module information appears in the status bar:



V 2.0436v19.1 , 18-10-04 , RM-1 , (c) NOKIA. / V 2.39.126 , 18-10-04 , RM-1 , (c)

Figure 21 Product support module information (example from RM-1)

Installing flash support files for FPS-10

Prerequisites

Note: You need to install flash support files for FPS-10 only, if you don't have the latest Phoenix available or the flash support files have changed after the latest Phoenix release.

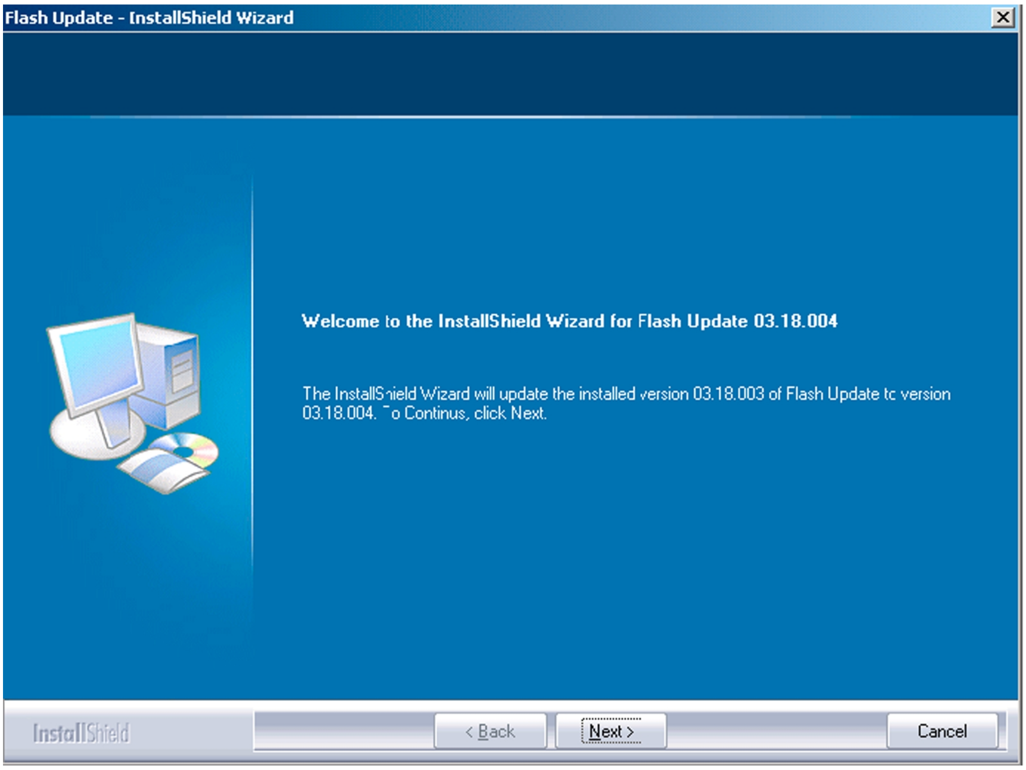
- Flash support files are installed automatically, when you install Phoenix. Use Phoenix packages later than June 2006.
- Normally it is enough to install Phoenix and the phone-specific data package because the Phoenix installation always includes the latest flash update package files for FPS-10.
- A separate installation package for flash support files is available, and the files can be updated according to this instruction, if updates appear between new Phoenix / data package releases

Context

If you are not using a separate installation package, you can skip this section and continue with "Updating FPS-10 flash prommer software" (page 3–22) after installing a new phone data package.

Steps

1. To begin installation, double- click *flash_update_x_yy.exe* .



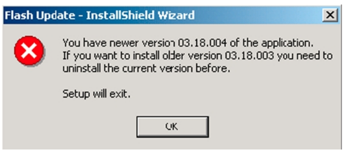
Welcome to the InstallShield Wizard for Flash Update 03.18.004

The InstallShield Wizard will update the installed version 03.18.003 of Flash Update to version 03.18.004. To Continue, click Next.

Figure 22 Flash update welcome dialog

If the same version of Flash Update package already exists, and you want to reinstall it, the previous package is first uninstalled. Restart installation again after that.

2. If you try to downgrade the existing version to older ones, the setup will be aborted. If you really want to downgrade, uninstall newer files manually from **Control Panel** and then rerun the installation again.



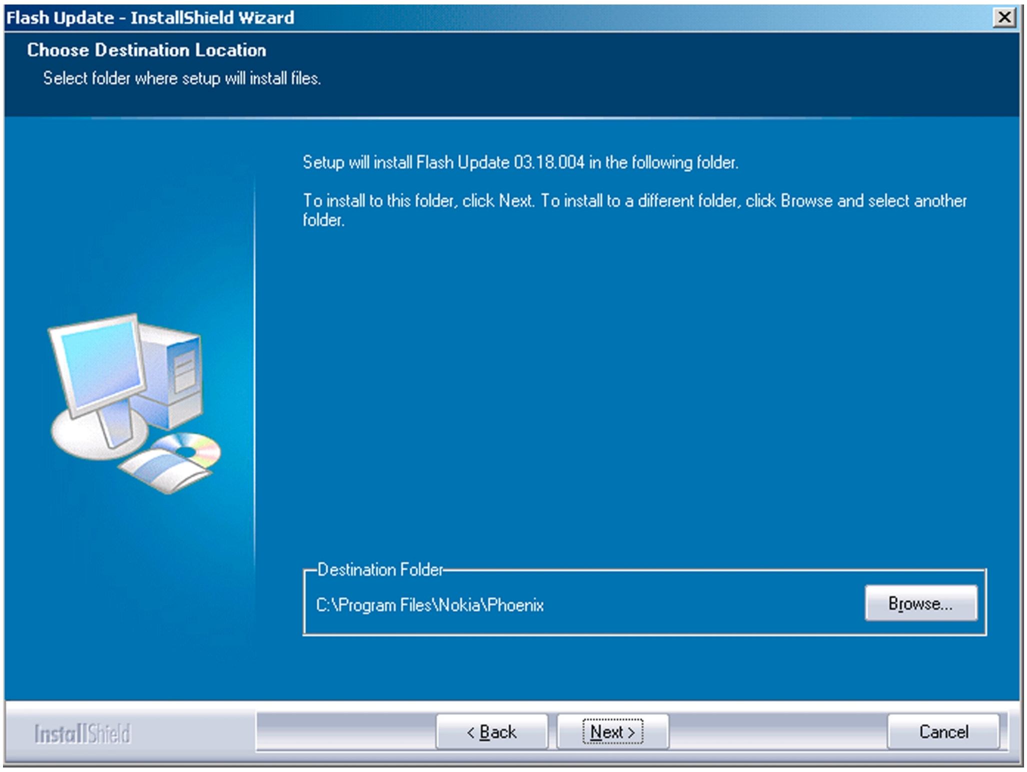
You have newer version 03.18.004 of the application.
If you want to install older version 03.18.003 you need to uninstall the current version before.

Setup will exit.

Figure 23 Flash installation interrupted

If an older version exists on your PC and it needs to be updated, click **Next** to continue installation.

3. It is highly recommended to install the files to the default destination folder *C:|Program Files|Nokia |Phoenix*. Click **Next** to continue.


Flash Update - InstallShield Wizard
Choose Destination Location
Select folder where setup will install files.
Destination Folder
Browse...
InstallShield
< Back
Next >
Cancel

Setup will install Flash Update 03.18.004 in the following folder.

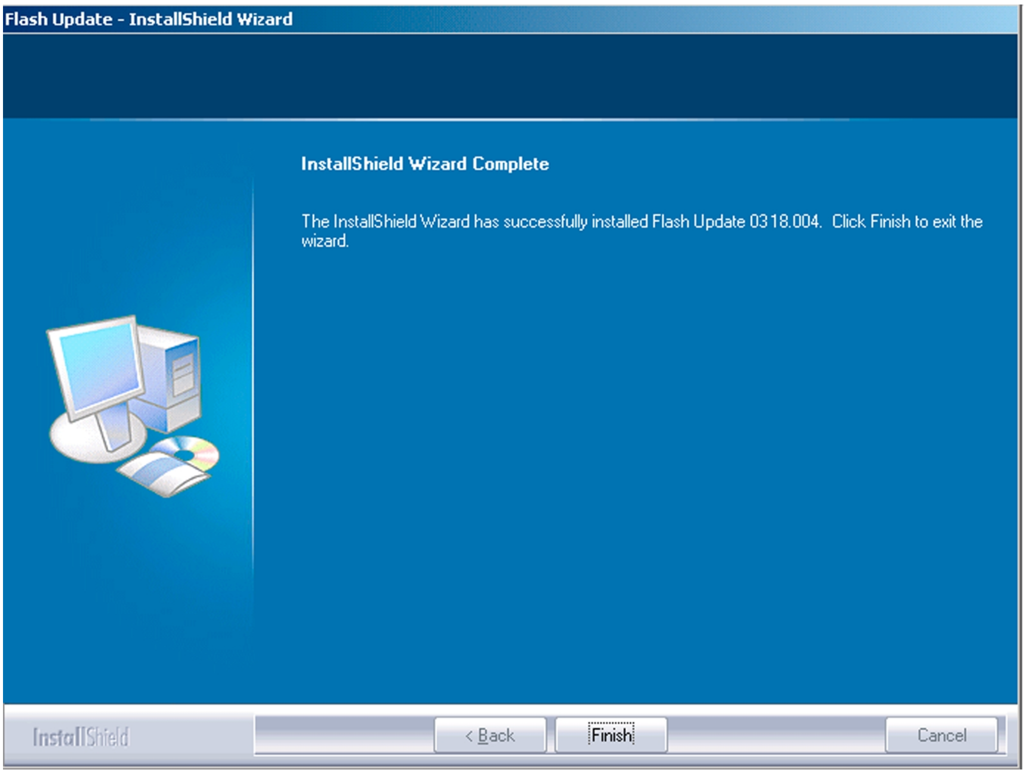
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.

C:\Program Files\Nokia\Phoenix

Figure 24 Flash destination folder

When installing the flash update files for the first time you may choose another location by selecting **Browse**. However, this is not recommended.

4. To complete the installation procedure, click **Finish** .



InstallShield Wizard Complete

The InstallShield Wizard has successfully installed Flash Update 0318.004. Click Finish to exit the wizard.

Figure 25 Finish flash update

Next actions

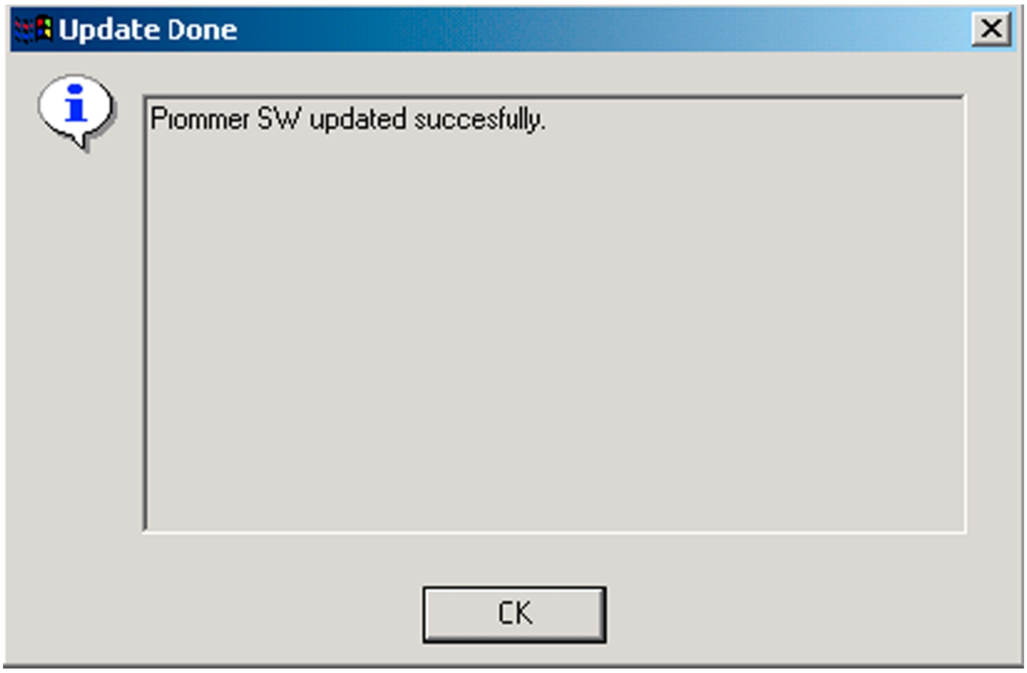
FPS-10 flash prommers must be updated using Phoenix!

Updating FPS-10 flash prommer software

Steps

1. Start *Phoenix Service Software* and log in, manage connection correctly for your flash prommer.
2. Choose **Flashing→Prommer maintenance** .
3. When the new flash update package is installed to the computer you will be asked to update the files to your Prommer. To update the files, click **Yes**. Click **OK** if the computer informs you about an unsafe removal of the device.
4. Alternatively you can update the FPS-10 flash prommer software by clicking the **Update** button.

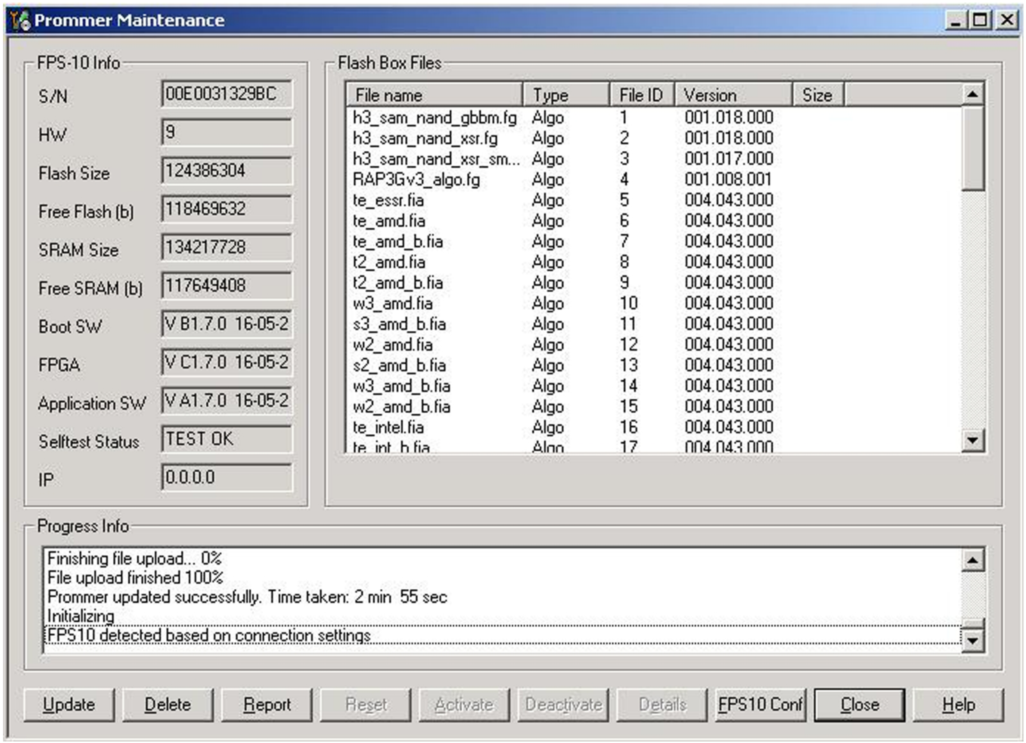
5. Wait until you are notified that update has been successful; the procedure will take a couple of minutes. Click **OK** to close the *Update Done* window.



Prommer SW updated succesfully.

Figure 26 Prommer SW update finished

6. If you are using the FPS-10 flash prommer, check that it is detected from the progress info. Check also the status leds in the FPS-10. The MODE2 led (green), VBAT and POWER leds (red) should be lit. If you are using LAN connection, the LAN led (yellow) should be blinking.
7. Check that your FPS-10 flash prommer has enough memory. Flashing the SU-18 with FPS-10 needs at least 128 MB of SRAM memory in the prommer.



S/N 00E0031329BC
HW 9
Flash Size 124386304
Free Flash (b) 118469632
SRAM Size 134217728
Free SRAM (b) 117649408
Boot SW V B1.7.0 16-05-2
FPGA V C1.7.0 16-05-2
Application SW V A1.7.0 16-05-2
Selftest Status TEST OK
IP 0.0.0.0

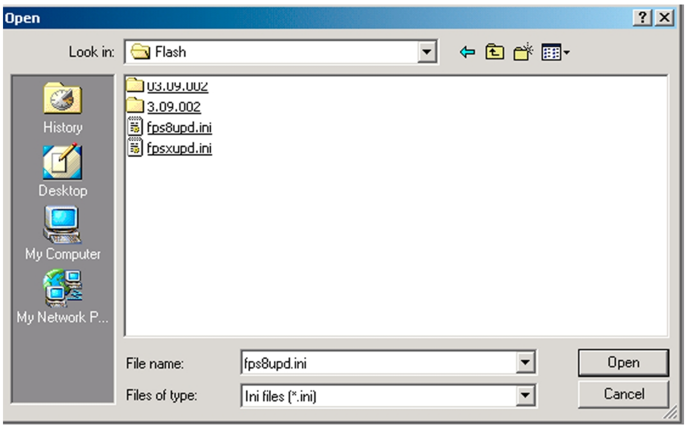
File name	Type	File ID	Version	Size
h3_sam_nand_gbbm.fg	Algo	1	001.018.000	
h3_sam_nand_xsr.fg	Algo	2	001.018.000	
h3_sam_nand_xsr_sm...	Algo	3	001.017.000	
RAP3Gv3_algo.fg	Algo	4	001.008.001	
te_essr.fia	Algo	5	004.043.000	
te_amd.fia	Algo	6	004.043.000	
te_amd_b.fia	Algo	7	004.043.000	
t2_amd.fia	Algo	8	004.043.000	
t2_amd_b.fia	Algo	9	004.043.000	
w3_amd.fia	Algo	10	004.043.000	
s3_amd_b.fia	Algo	11	004.043.000	
w2_amd.fia	Algo	12	004.043.000	
s2_amd_b.fia	Algo	13	004.043.000	
w3_amd_b.fia	Algo	14	004.043.000	
w2_amd_b.fia	Algo	15	004.043.000	
te_intel.fia	Algo	16	004.043.000	
te_int_b.fia	Algo	17	004.043.000	

```
Finishing file upload... 0%
File upload finished 100%
Prommer updated successfully. Time taken: 2 min  55 sec
Initializing
FPS10 detected based on connection settings
```

Figure 27 Prommer maintenance window

Alternative steps

- You can update FPS-10 SW by clicking the **Update** button and selecting the appropriate fpsxupd.ini file in *C:|Program Files|Nokia|Phoenix|Flash*.



Look in: Flash

File name: fps8upd.ini

Files of type: Ini files (*.ini)

Open
03.09.002
3.09.002
fps8upd.ini
fpsxupd.ini
History
Desktop
My Computer
My Network P...
Open
Cancel

Figure 28 Flash directory window

- All files can be loaded separately to the prommer used. To do this, click the right mouse button in the *Flash box files* window and select the file type to be loaded.

  More information can be found in Phoenix **Help**.

4 — Service Tools and Service Concepts

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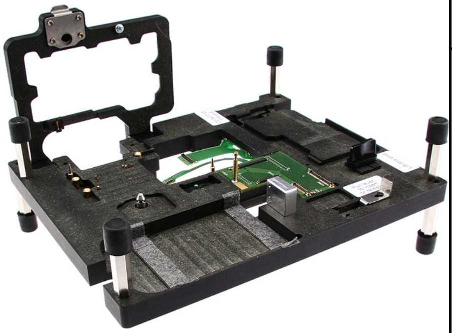
New service tools

The table below gives a short overview of service tools that can be used for testing, error analysis and repair of product RM-55, refer to various concepts.

	CA-64U	Video-out cable	
	CA-64U is used to check TV-out functionality.		
	FS-25	Flash adapter	
	Flash adapter FS-25 is used for phone testing and flashing. FS-25 is used with the generic flash adapter base SS-62 and control Unit CU-4 or interface adapter SS-46. When flashing or system testing the phone, the adapter is attached to replace the phone own battery. All functions (as well as the calibration voltages, current and the protections for over voltages, over current and voltage polarity), are performed by CU-4. Flash adapter FS-25 main features: • VBATT supply interface • USB / FBUS multiplexed interface to the phone • Supply voltage for light source		



MJ-74	Module jig	

MJ-74 is meant for component level troubleshooting.

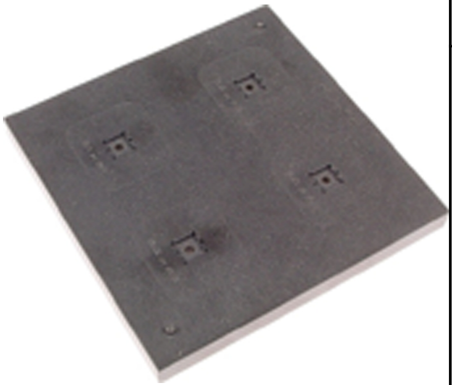
The jig includes an RF interface for GSM, WCDMA, Bluetooth and WLAN. In addition, it has the following features:

- Provides mechanical interface with the engine module
- Provides galvanic connection to all needed test pads in module
- Multiplexing between USB and FBUS media, controlled by Vusb
- UI test interface
- SD interface
- Duplicated SIM connector
- Audio components: IHF, MIC, earpiece
- Connector for control unit
- Access for Pop-Port^{TM} system connector

Note: MJ-74 should be used together with CU-4. CU-4 is not part of the MJ-74 sales package and has to be ordered separately.

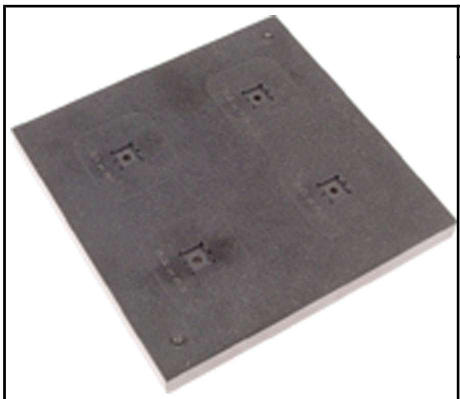
Table 8 Attenuation values

Band	Tuning channel	Attenuation Rx	Attenuation Tx
GSM900	Rx: 942.4 MHz,Tx: 897.4 MHz	0.1 dB	0.1 dB
GSM1800	Rx: 1842.8 MHz,Tx: 1747.8 MHz	0.1 dB	0.1 dB
GSM1900	Rx: 1950 MHz,Tx: 1880 MHz	0.12 dB	0.12 dB
WCDMA2100	Rx: 2140 MHz,Tx: 1960 MHz	0.12 dB	0.12 dB
WLAN	2442 MHz	0.15 dB	0.15 dB



RJ-115	Rework jig	

RJ-115 is a rework jig used with ST-43.



RJ-117	Rework jig	

RJ-117 is a rework jig used with ST-45.

RJ-80	Soldering jig	

RJ-80 is a soldering jig used for soldering and as a rework jig for the engine module.

SA-117	RF coupler	

SA-117 is used for RF testing with FS-25, SS-62 and CU-4.

- **Table 9 Attenuation values**

Band	Channel	Attenuation Rx	Tolerance Rx	Attenuation Tx	Tolerance Rx
GSM900	Low				
	Mid	7.5	+-1.5	7.5	+-1.5
	High				
GSM1800	Low				
	Mid	7.8	+-1.5	7.7	+-1.5
	High				
GSM1900	Low				
	Mid	7.9	+-1.5	7.7	+-1.5
	High				
WCDMA 2100	Low				
	Mid	8.5	+-1.5	8	+-1.5
	High				

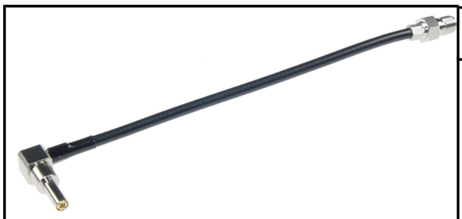
SS-86	Domesheet jig	

SS-86 is used to align position when domesheet is changed in a service center.

General service tools

The table below gives a short overview of service tools that can be used for testing, error analysis and repair of product RM-55, refer to various concepts.

	CA-31D	USB cable	
	The CA-31D USB cable is used to connect FPS-10 or FPS-11 to a PC. It is included in the FPS-10 and FPS-11 sales packages.		
	CA-35S	Power cable	
	CA-35S is a power cable for connecting, for example, the FPS-10 flash prommer to the Point-Of-Sales (POS) flash adapter.		
	CA-53	USB connectivity cable	
	USB to system connector cable.		



CA-58RS	RF tuning cable	

RF tuning cable for use with a flash adapter.

CA-58RS RF cable extends adapter features to allow RF function tests and RF tuning in GSM bands.

Features include:

- easy to use together with flash adapter or even stand alone
- most accurate RF connection to phone module under test
- most accurate RF connection to phone module under test
- low attenuation and small “ripple” over the width of each GSM band

Note: The RF cable must be used for RF tuning.

- **Table 10 Attenuation values**

Band	Tuning channel	Attenuation Rx	Attenuation Tx
GSM900	Rx: 942.4 MHz,Tx: 897.4 MHz	0.25 dB	0.25 dB
GSM1800	Rx: 1842.8 MHz,Tx: 1747.8 MHz	0.37 dB	0.35 dB
GSM1900	Rx: 1950 MHz,Tx: 1880 MHz	0.4 dB	0.38 dB
WCDMA2100	Rx: 2140 MHz,Tx: 1960 MHz	0.4 dB	0.4 dB
WLAN	2442 MHz	0.42 dB	0.42 dB

CU-4	Control unit	

CU-4 is a general service tool used with a module jig and/or a flash adapter. It requires an external 12 V power supply.

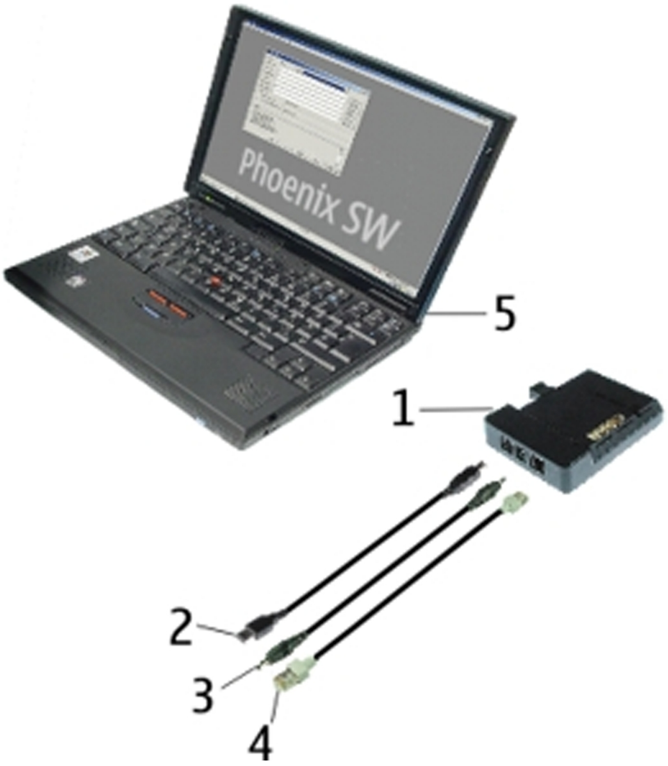
The unit has the following features:

- software controlled via USB
- EM calibration function
- Forwards FBUS/Flashbus traffic to/from terminal
- Forwards USB traffic to/from terminal
- software controlled BSI values
- regulated VBATT voltage
- 2 x USB2.0 connector (Hub)
- FBUS and USB connections supported

When using CU-4, note the special order of connecting cables and other service equipment:

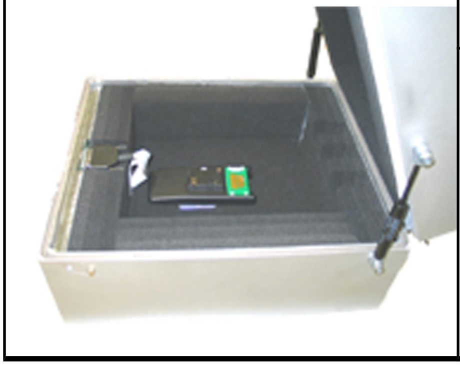
Instructions

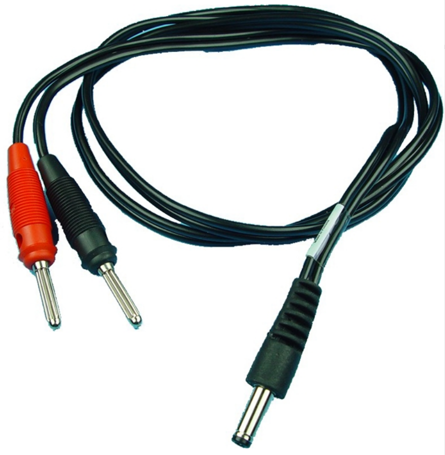
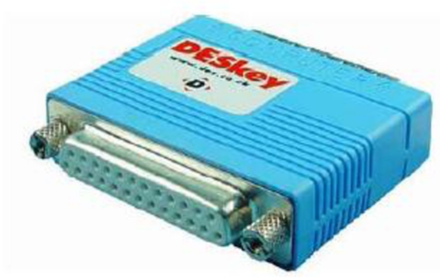
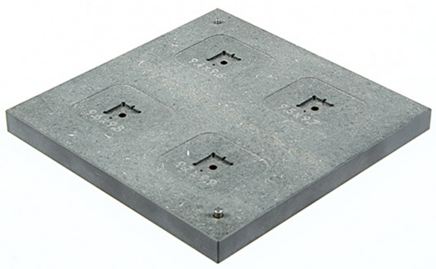
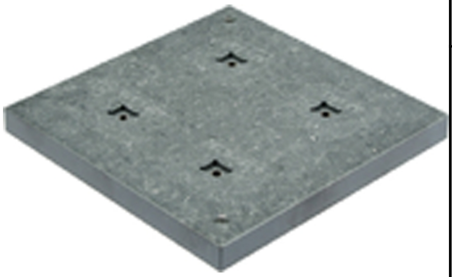
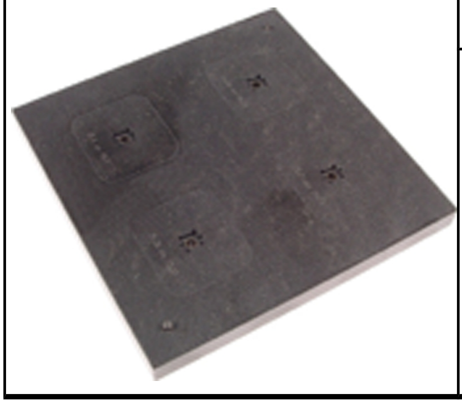
1. Connect a service tool (jig, flash adapter) to CU-4.
2. Connect CU-4 to your PC with a USB cable.
3. Connect supply voltage (12 V)
4. Connect an FBUS cable (if necessary).
5. Start Phoenix service software.

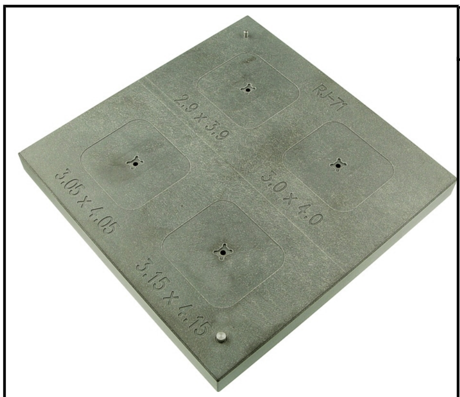


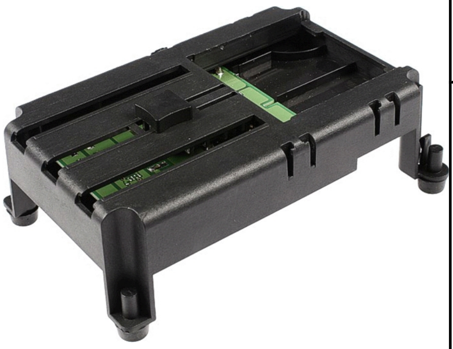
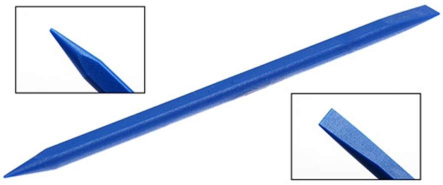
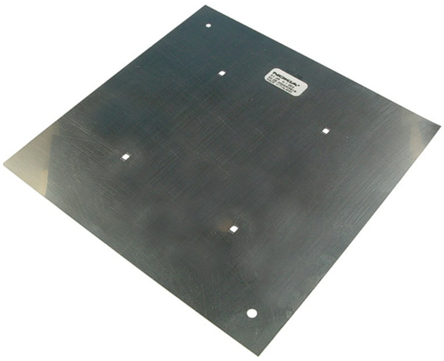
Note: Phoenix enables CU-4 regulators via USB when it is started.

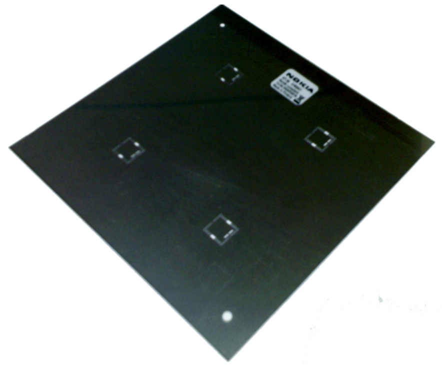
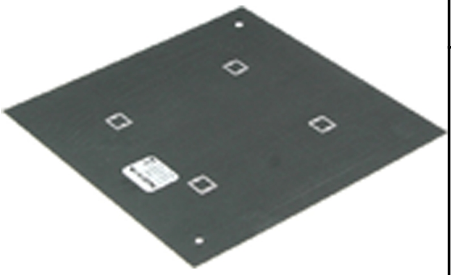
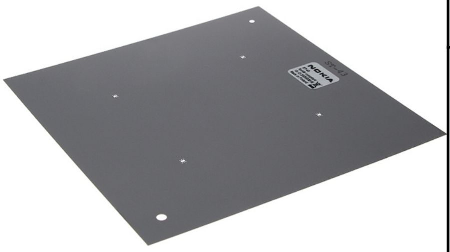
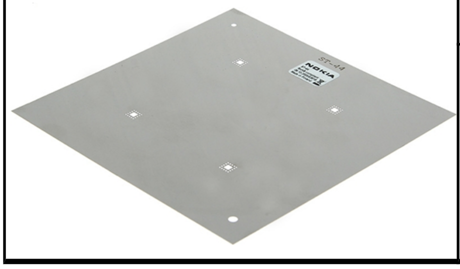
Reconnecting the power supply requires a Phoenix restart.

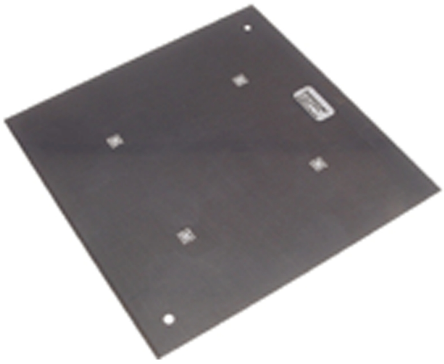
	DAU-9S	MBUS cable	
	The MBUS cable DAU-9S has a modular connector and is used, for example, between the PC's serial port and module jigs, flash adapters or docking station adapters. **Note:** Docking station adapters valid for DCT4 products.		
	FPS-10	Flash prommer	
	FPS-10 interfaces with: • PC • Control unit • Flash adapter • Smart card FPS-10 flash prommer features: • Flash functionality for BB5 and DCT-4 terminals • Smart Card reader for SX-2 or SX-4 • USB traffic forwarding • USB to FBUS/Flashbus conversion • LAN to FBUS/Flashbus and USB conversion • Vusb output switchable by PC command FPS-10 sales package includes: • FPS-10 prommer • Power Supply with 5 country specific cords • USB cable		
	JXS-1	RF shield box	
	Because the WCDMA network disturbs the RX side testing of the WCDMA phone and the Tx signal of the WCDMA phone can severely disturb the WCDMA network, a shield box is needed in all testing, tuning and fault finding which requires WCDMA RF signal. The shield box is not an active device, it contains only passive filtering components for RF attenuation.		

<table>
<tr><td rowspan="2"></td><td>PCS-1</td><td>Power cable</td><td></td></tr>
<tr><td colspan="3">The PCS-1 power cable (DC) is used with a docking station, a module jig or a control unit to supply a controlled operating voltage.</td></tr>
<tr><td rowspan="2"> </td><td>PKD-1</td><td>SW security device</td><td></td></tr>
<tr><td colspan="3">SW security device is a piece of hardware enabling the use of the service software when connected to the parallel (LPT) port of the PC.
Without the device, it is not possible to use the service software.
Printer or any such device can be connected to the PC through the device if needed.</td></tr>
<tr><td rowspan="2"></td><td>RJ-103</td><td>Rework jig</td><td></td></tr>
<tr><td colspan="3">RJ-103 is a rework jig used with rework stencil ST-36.</td></tr>
<tr><td rowspan="2"></td><td>RJ-104</td><td>Rework jig</td><td></td></tr>
<tr><td colspan="3">RJ-104 is a rework jig used when servicing the BTHFM module. It is used together with rework stencil ST-37.</td></tr>
<tr><td rowspan="2"></td><td>RJ-57</td><td>Rework jig</td><td></td></tr>
<tr><td colspan="3">RJ-57 is a rework jig used with ST-44.</td></tr>
</table>

	RJ-71	Rework jig	
	RJ-71 is a rework jig used with ST-26 rework stencil.		
	RJ-93	Rework jig	
	RJ-93 is used as a rework jig for the engine module. This stencil takes the front end module (FEM) or power amplifier (PA) module for spreading the soldering paste to the component. Must be used together with the ST-40 stencil.		
	SB-6	Bluetooth tester	
	The SB-6 test box is a generic device to perform Bluetooth bit error rate testing and doing cordless FBUS connection via Bluetooth.		
	SB-7	WLAN test box	
	WLAN test requires defined position for the device.		

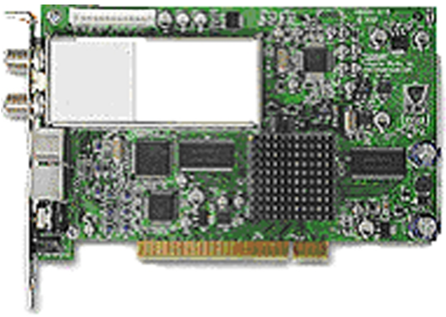
<table>
<tr><td rowspan="2"> </td><td>SRT-6</td><td>Opening tool</td><td></td></tr>
<tr><td colspan="3">SRT-6 is used to open phone covers and B-to-B connectors.</td></tr>
<tr><td rowspan="2"> </td><td>SS-46</td><td>Interface adapter</td><td></td></tr>
<tr><td colspan="3">SS-46 acts as an interface adapter between the flash adapter and FPS-10.</td></tr>
<tr><td rowspan="2"></td><td>SS-62</td><td>Generic flash adapter base for BB5</td><td></td></tr>
<tr><td colspan="3">• generic base for flash adapters and couplers
• SS-62 equipped with a clip interlock system
• provides standardised interface towards Control Unit
• provides RF connection using galvanic connector or coupler
• multiplexing between USB and FBUS media, controlled by VUSB</td></tr>
<tr><td rowspan="2"></td><td>SS-93</td><td>Opening tool</td><td></td></tr>
<tr><td colspan="3">SS-93 is used for opening JAE connectors.</td></tr>
<tr><td rowspan="2"></td><td>ST-26</td><td>Rework stencil</td><td></td></tr>
<tr><td colspan="3">ST-26 is a rework stencil used with rework jig RJ-71.</td></tr>
</table>

<table>
<tr><td rowspan="2"></td><td>ST-36</td><td>Rework stencil</td><td></td></tr>
<tr><td colspan="3">ST-36 is a rework stencil used with rework jig RJ-103.</td></tr>
<tr><td rowspan="2"></td><td>ST-37</td><td>BTHFM rework stencil</td><td></td></tr>
<tr><td colspan="3">ST-37 stencil is used with RJ-104 BTHFM rework jig.</td></tr>
<tr><td rowspan="2"> </td><td>ST-40</td><td>PA rework stencil</td><td></td></tr>
<tr><td colspan="3">This stencil is to be used together with RJ-93 and covering FEM module.</td></tr>
<tr><td rowspan="2"></td><td>ST-43</td><td>Rework stencil</td><td></td></tr>
<tr><td colspan="3">ST-43 is a rework stencil used with rework jig RJ-115.</td></tr>
<tr><td rowspan="2"></td><td>ST-44</td><td>Rework stencil</td><td></td></tr>
<tr><td colspan="3">ST-44 is a rework stencil used with rework jig RJ-57.</td></tr>
</table>

<table>
<tr><td rowspan="2"></td><td>ST-45</td><td>Rework stencil</td><td></td></tr>
<tr><td colspan="3">ST-45 is a rework stencil used with rework jig RJ-117.</td></tr>
<tr><td rowspan="2"> </td><td>SX-4</td><td>Smart card</td><td></td></tr>
<tr><td colspan="3">SX-4 is a BB5 security device used to protect critical features in tuning and testing.
SX-4 is also needed together with FPS-10 when DCT-4 phones are flashed.</td></tr>
<tr><td rowspan="2"> </td><td>XCS-4</td><td>Modular cable</td><td></td></tr>
<tr><td colspan="3">XCS-4 is a shielded (one specially shielded conductor) modular cable for flashing and service purposes.</td></tr>
<tr><td rowspan="2"> </td><td>XRS-6</td><td>RF cable</td><td></td></tr>
<tr><td colspan="3">The RF cable is used to connect, for example, a module repair jig to the RF measurement equipment.
SMA to N-Connector approximately 610 mm.
Attenuation for:
• GSM850/900: 0.3+-0.1 dB
• GSM1800/1900: 0.5+-0.1 dB
• WLAN: 0.6+-0.1dB</td></tr>
</table>

Non-standard service tools

The table below gives a short overview of service tools that can be used for testing, error analysis and repair of product RM-55, refer to various concepts.

<table>
<tr><td rowspan="2"></td><td></td><td>PC TV card</td><td></td></tr>
<tr><td colspan="3">A PC TV card can be used for testing the TV-out functionality. The minimum requirements for a TV card are the following:
• Video formats:
  • NTSC and PAL input support
• Physical inputs:
  • female inputs
  • composite video input
  • RCA Audio input or an input adaptable to RCA using a converter cable (e.g. 3.5 mm input)
Different devices are available from various vendors, and can be used without special approval from Nokia.</td></tr>
<tr><td rowspan="2"> </td><td></td><td>Standard TV set</td><td></td></tr>
<tr><td colspan="3">A standard TV set is used for testing the TV-out functionality of the device. A commercial colour TV set with compatible video formats (NTSC or PAL) can be used in service centers.
Different devices are available from various vendors, and can be used without special approval from Nokia.</td></tr>
</table>

Service concepts

Flash concept with FPS-10

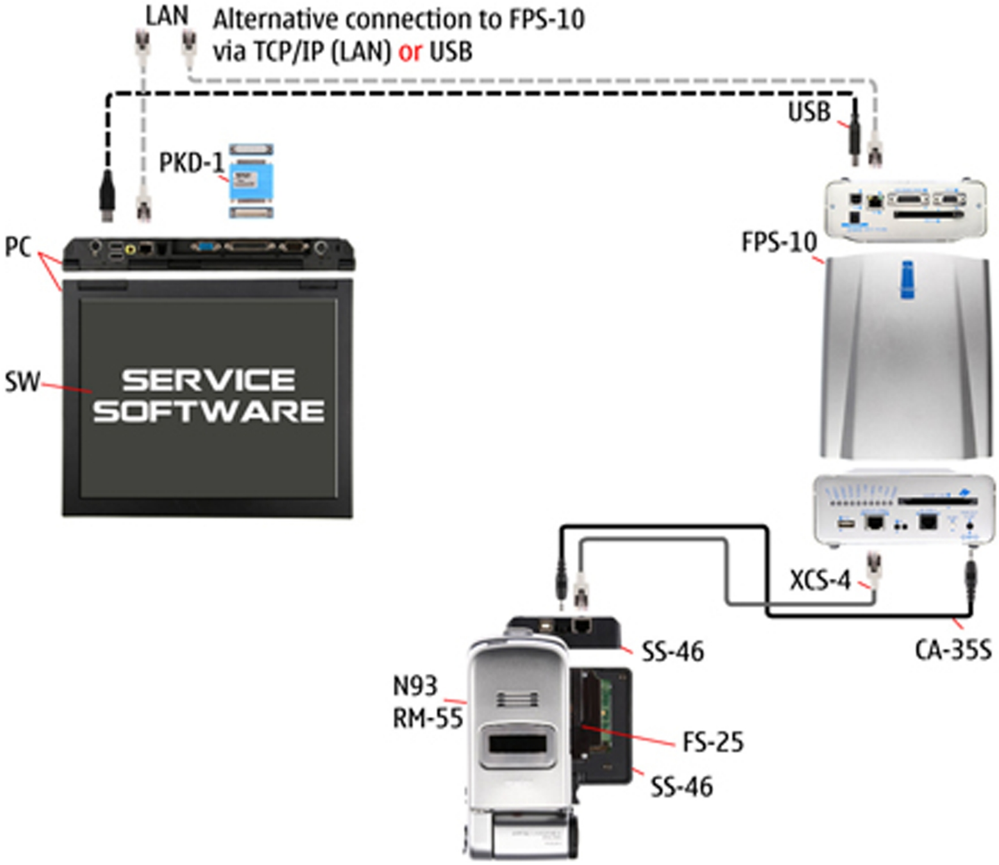

LAN
Alternative connection to FPS-10
via TCP/IP (LAN) or USB
USB
PKD-1
PC
SW
SERVICE
SOFTWARE
FPS-10
XCS-4
CA-35S
SS-46
N93
RM-55
FS-25
SS-46

Figure 29 Basic flash concept with FPS-10

Note: FPS-8 concept can also be used for flashing.

Item	Type	Description
1	FS-25	Flash adapter
2	SS-46	Interface adapter
3	CA-35S	Power cable
4	XCS-4	Modular cable
5	FPS-10	Flash prommer box
6		Standard USB cable
7	PKD-1	SW security device

MJ-74 module jig concept

The module jig concept is meant for BB / RF testing + tuning and for flashing purposes.

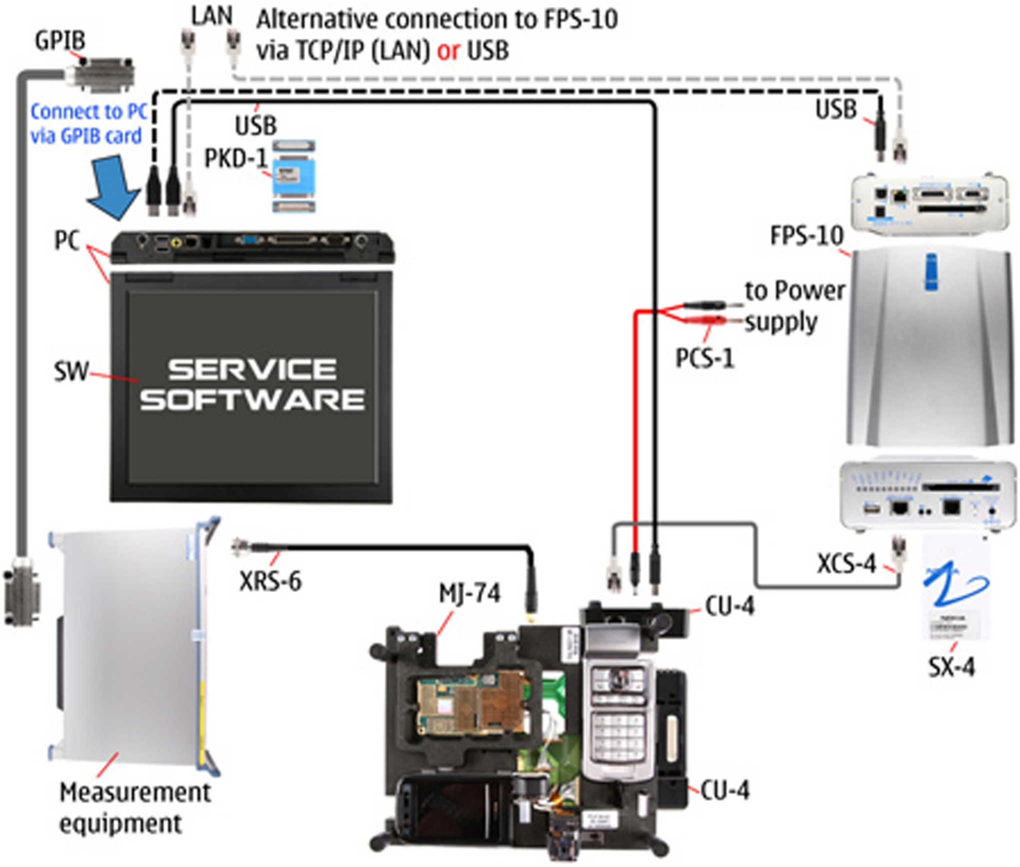

GPIB
LAN
Alternative connection to FPS-10 via TCP/IP (LAN) or USB
Connect to PC via GPIB card
USB
PKD-1
USB
PC
FPS-10
to Power supply
PCS-1
SW
SERVICE SOFTWARE
XRS-6
MJ-74
CU-4
XCS-4
SX-4
CU-4
Measurement equipment

Figure 30 MJ-78 module jig service concept

Item	Type	Description
1	MJ-74	Module jig
2	CU-4	Control unit
3	FPS-10	Flash prommer box
4	SX-4	Smart card
5	XCS-4	Modular cable
6	PCS-1	DC power cable
7		Standard USB cable
8		Standard USB cable
9		GPIB control cable
10	XRS-6	RF cable
11	PKD-1	SW security device
12		RF shield box

Note: Item 12 not shown in the picture.

POS (Point of Sale) flash concept

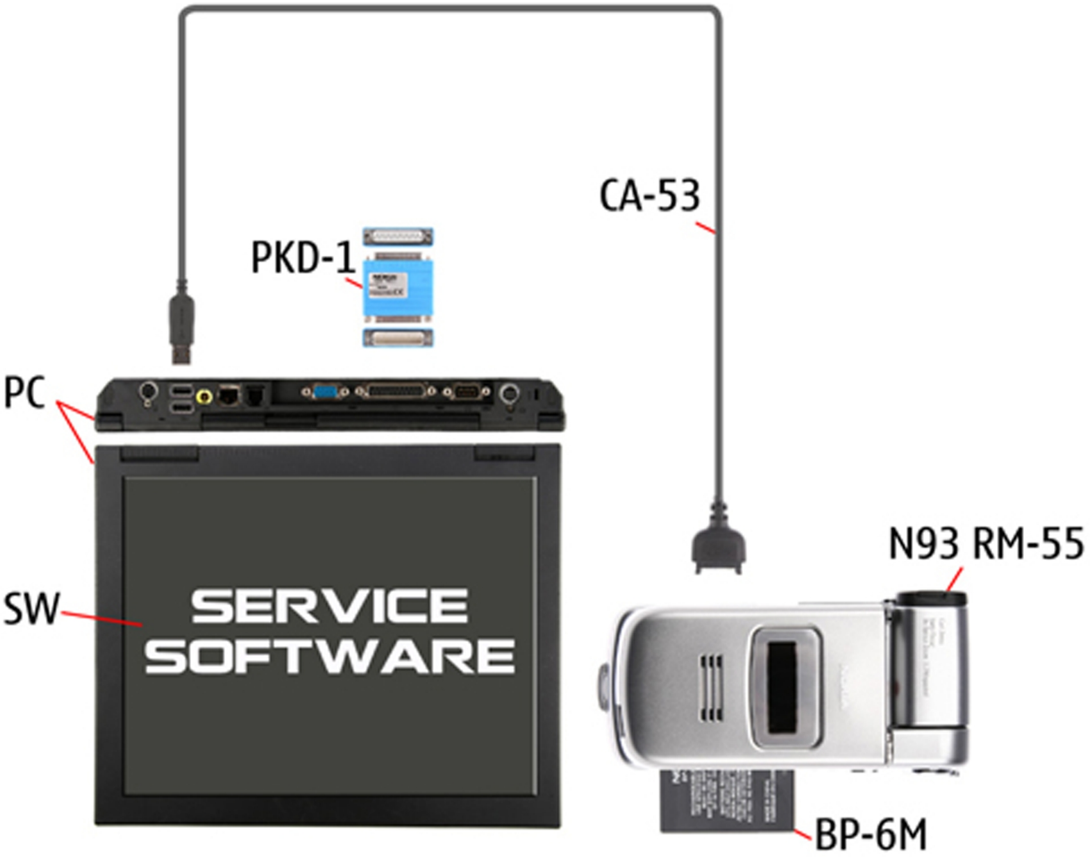

CA-53
PKD-1
PC
SW
SERVICE SOFTWARE
N93 RM-55
BP-6M

Figure 31 POS flash concept

Item	Type	Description
1	CA-53	USB connectivity cable
2	PKD-1	SW security device

Service concept for RF/BB testing and tuning

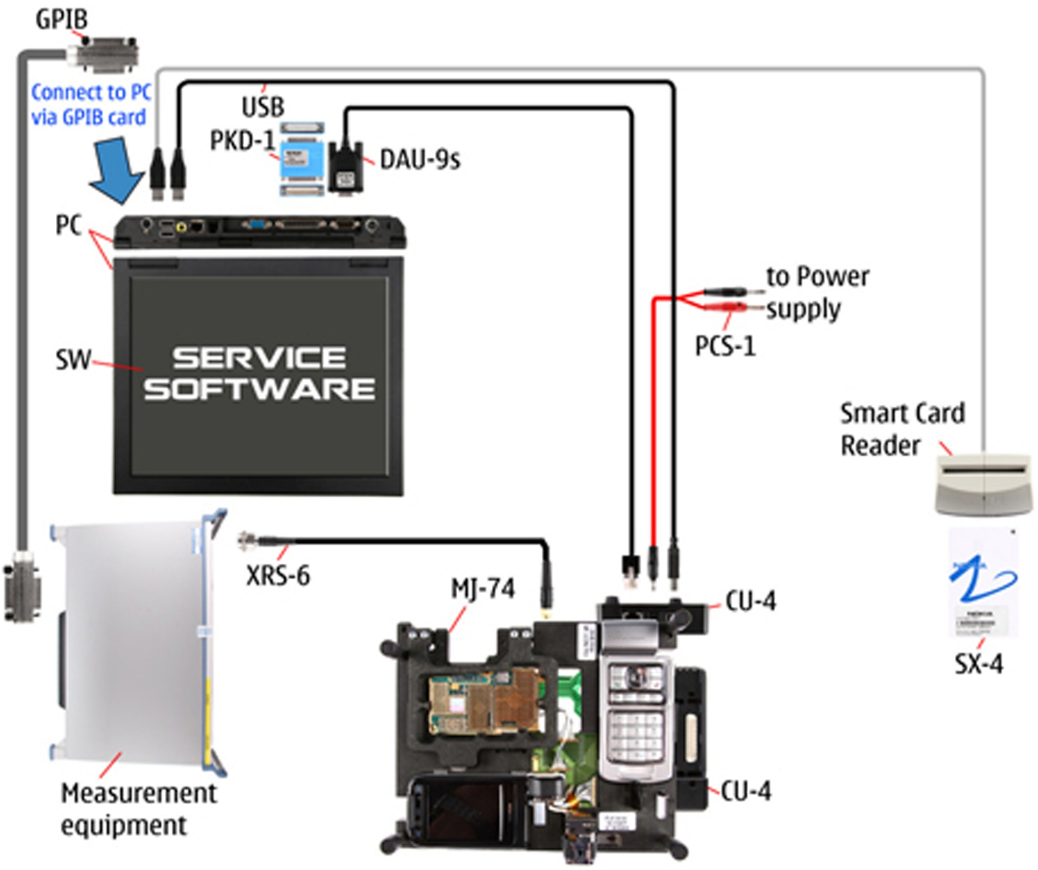

GPIB
Connect to PC via GPIB card
USB
PKD-1
DAU-9s
PC
SW
SERVICE SOFTWARE
to Power supply
PCS-1
Smart Card Reader
XRS-6
MJ-74
CU-4
SX-4
CU-4
Measurement equipment

Figure 32 Service concept for RF/BB testing and tuning

Item	Type	Description
1	MJ-74	Module jig
2	SS-62 + CU-4	Flash adapter base and control unit
3		Standard USB cable
4	PCS-1	DC power cable
5		Standard USB cable + smart card reader
6	SX-4	Smart card
7	XRS-6	RF cable
8		GPIB control cable
9	PKD-1	SW security device
10	DAU-9S	MBUS cable
11		RF shield box

Note: Item 11 not shown in the picture.

CU-4 flash concept with FPS-10

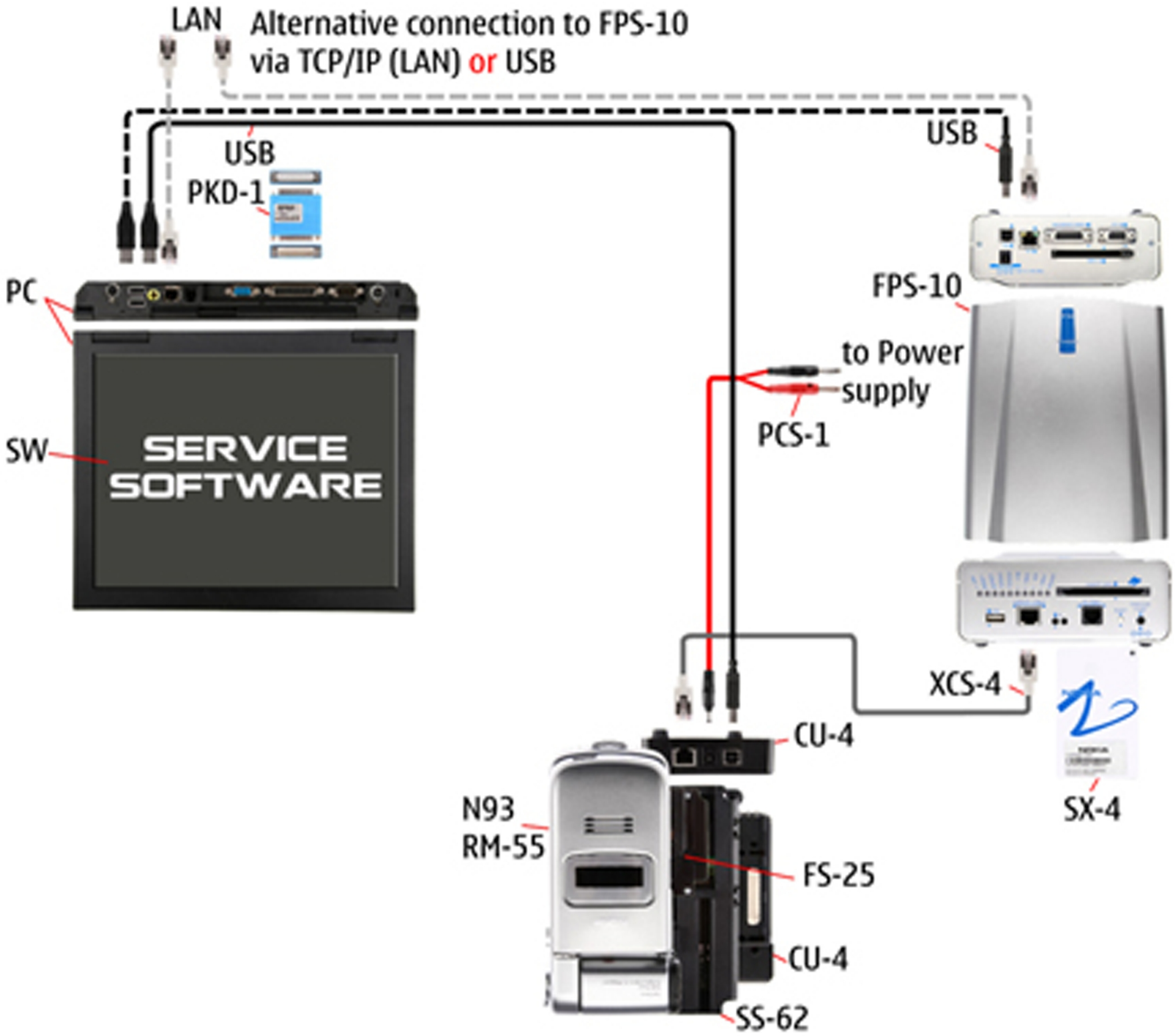

LAN
Alternative connection to FPS-10
via TCP/IP (LAN) or USB
USB
PKD-1
USB
PC
SW
SERVICE
SOFTWARE
FPS-10
to Power
supply
PCS-1
XCS-4
CU-4
N93
RM-55
SX-4
FS-25
CU-4
SS-62

Figure 33 CU-4 flash concept with FPS-10

Note: FPS-8 concept can also be used for flashing.

Item	Type	Description
1	FS-25	Flash adapter
2	SS-62 + CU-4	Flash adapter base and control unit
3	XCS-4	Modular cable
4	PCS-1	Power cable
5	FPS-10	Flash prommer box
6		Standard USB cable

Item	Type	Description
7		Standard USB cable
8	PKD-1	SW security device

RF testing and BB testing/tuning with RF cable

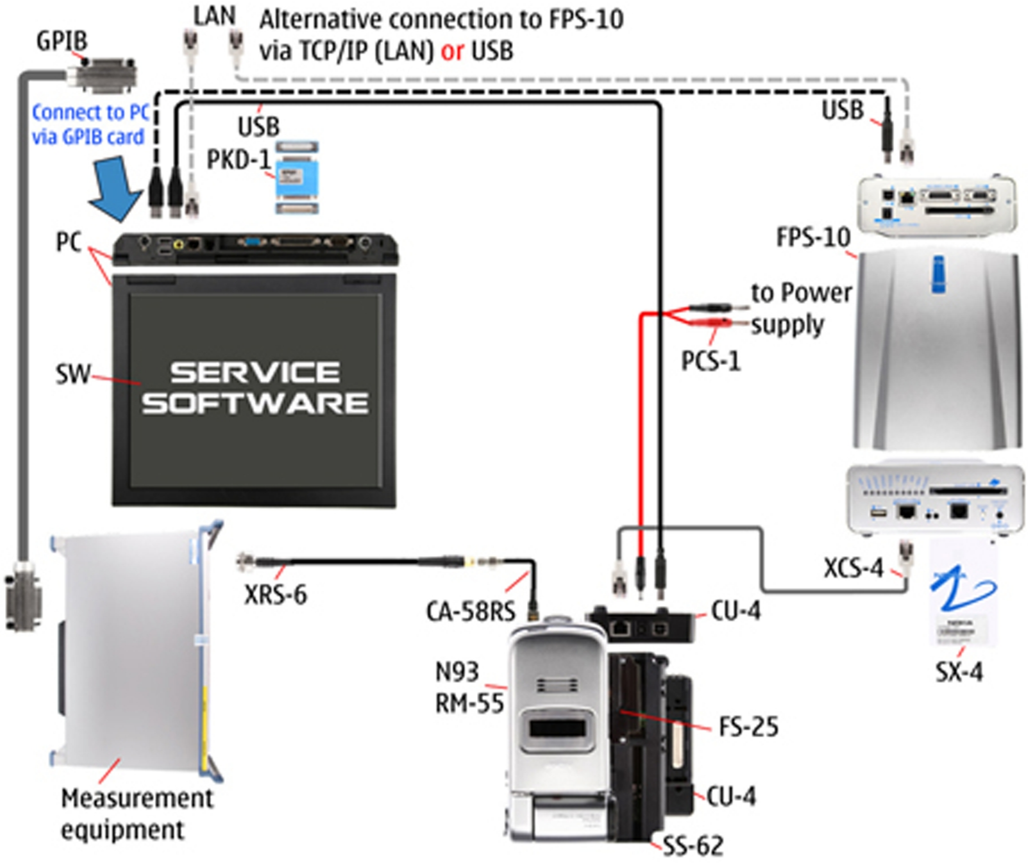

LAN
Alternative connection to FPS-10
via TCP/IP (LAN) or USB
GPIB
Connect to PC
via GPIB card
USB
PKD-1
USB
PC
FPS-10
to Power
supply
PCS-1
SW
SERVICE
SOFTWARE
XCS-4
XRS-6
CA-58RS
CU-4
SX-4
N93
RM-55
FS-25
CU-4
SS-62
Measurement
equipment

Figure 34 RF testing and BB testing/tuning

Item	Type	Description
1	FS-25	Flash adapter
2	SS-62 + CU-4	Flash adapter base and control unit
3	CA-58RS	RF cable
4	PCS-1	Power cable
5		Standard USB cable
6	SX-4	Smart card
7		GPIB control cable
8	XRS-6	RF cable
9	PKD-1	SW security device
10		RF shield box

Note: Item 10 not shown in the picture.

RF testing and BB testing/tuning with RF coupler

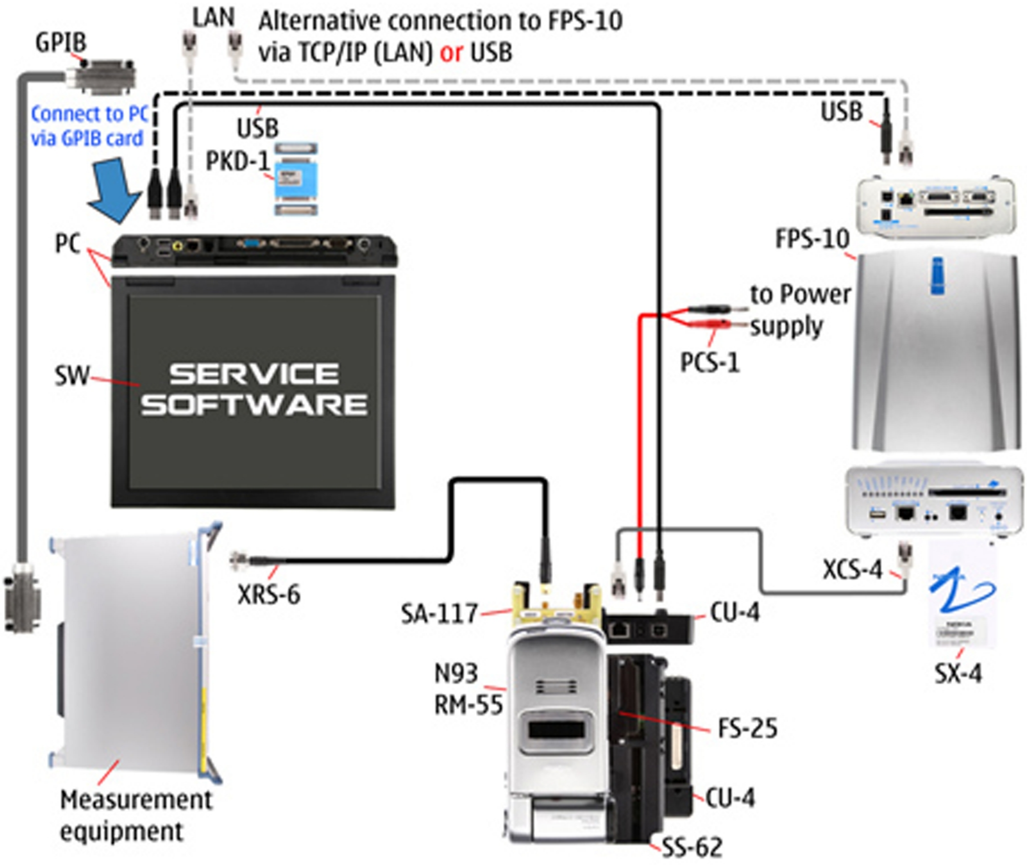

LAN
Alternative connection to FPS-10
via TCP/IP (LAN) or USB
GPIB
Connect to PC
via GPIB card
USB
PKD-1
USB
PC
FPS-10
to Power
supply
PCS-1
SW
SERVICE
SOFTWARE
XRS-6
SA-117
CU-4
XCS-4
N93
RM-55
SX-4
FS-25
CU-4
SS-62
Measurement
equipment

Figure 35 RF testing and BB testing/tuning with RF coupler

Item	Type	Description
1	FS-25	Flash adapter
2	SS-62 + CU-4	Flash adapter base and control unit
3	SA-117	RF coupler
4	PCS-1	Power cable
5	FPS-10	Flash prommer
6		Standard USB cable
7	SX-4	Smart card
8		GPIB control cable
9	XRS-6	RF cable
10	PKD-1	SW security device
11		RF shield box

Note: Item 11 not shown in the picture.

TV-out testing concept

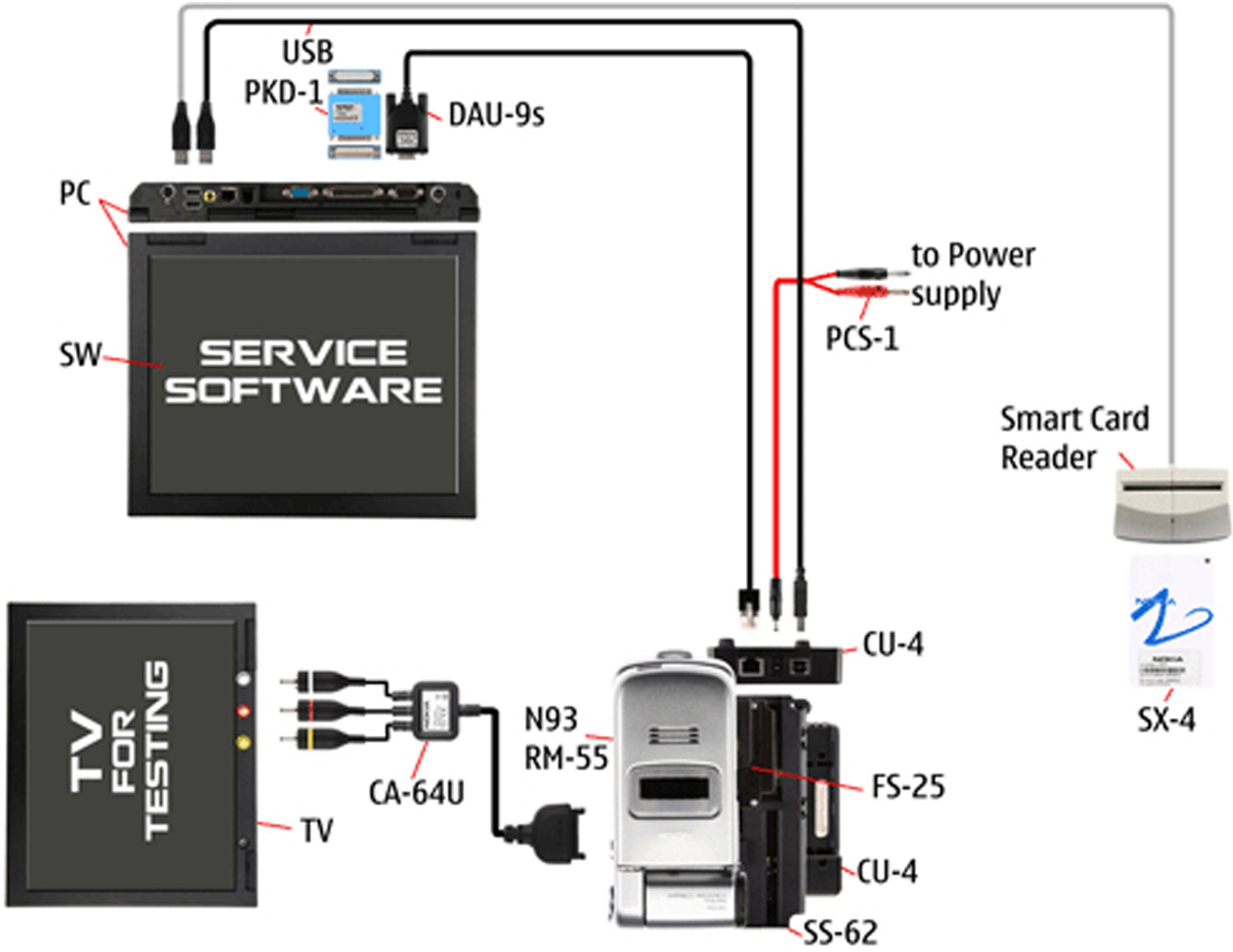

USB
PKD-1
DAU-9s
PC
SW
SERVICE SOFTWARE
to Power supply
PCS-1
Smart Card Reader
TV FOR TESTING
TV
CA-64U
N93
RM-55
CU-4
FS-25
CU-4
SS-62
SX-4

Figure 36 TV-out testing

Item	Type	Description
1	FS-25	Flash adapter
2	SS-62 + CU-4	Flash adapter base and control unit
3	CA-64U	Video-out cable
4	PCS-1	Power cable
5		Standard USB cable
6		Standard USB cable + smart card reader
7	SX-4	Smart card
8	PKD-1	SW security device
9		TV set

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5 — Disassembly/reassembly instructions

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Lower block reassembly........5–50

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Figure 38 Needed tools: SRT-6,SS-93, metal tweezers, a dental pic, the torque driver with a torx plus and a torx size 6 bit, a torx plus and a torx driver size 6 and a DC plug........5–35

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Upper block disassembly

Prerequisites

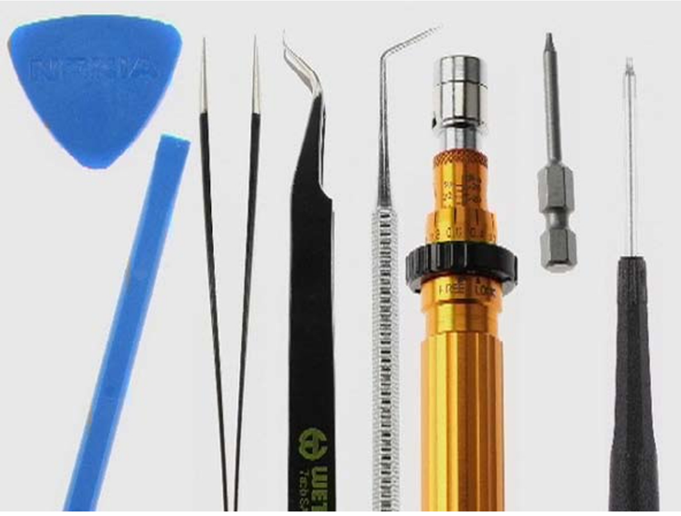
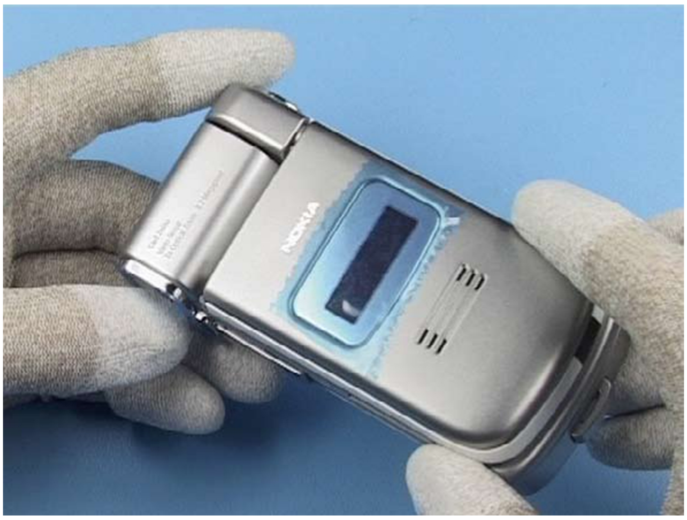


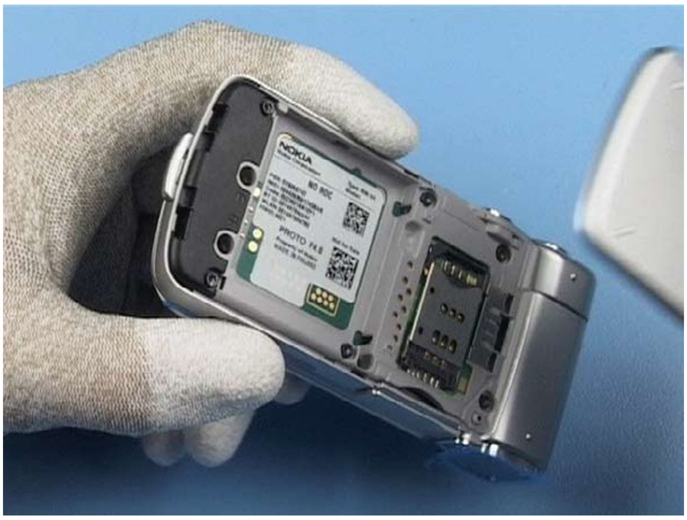
Figure 37 Needed tools: SRT-6, SS-93, metal tweezers, angled tweezers, a dental pic, a torx driver with a torx plus size 6 bit, and a torx plus driver size 6.

Steps

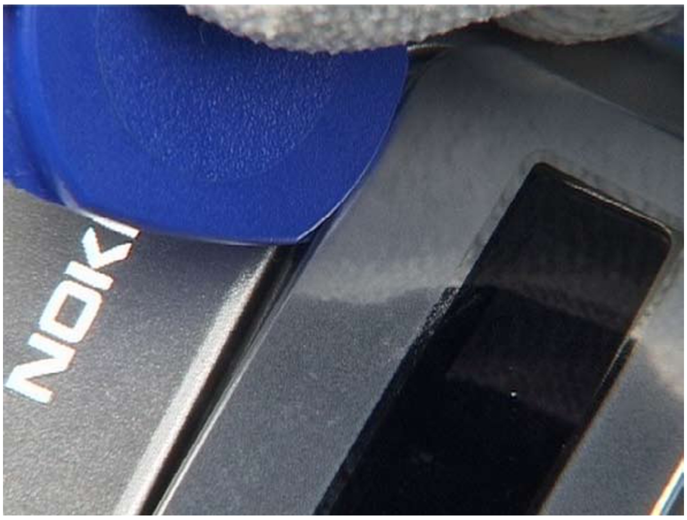
1. Cover all windows with a plastic film.



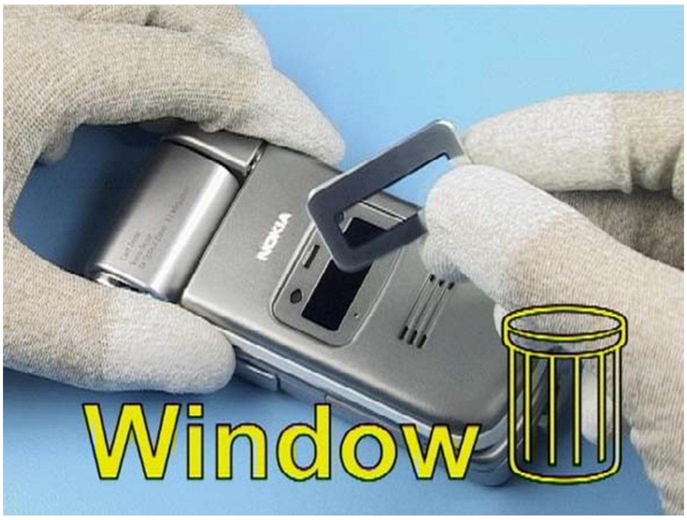
2. Ensure that no battery is inserted before going on.



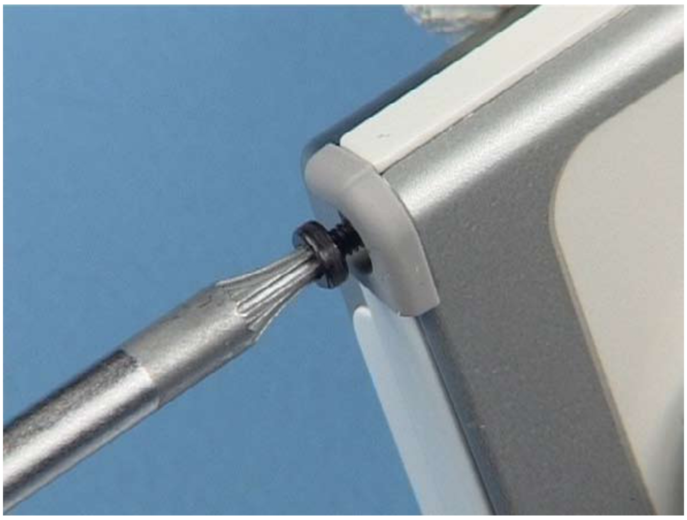
3. Pry open the Sub Display Window with the SRT-6.



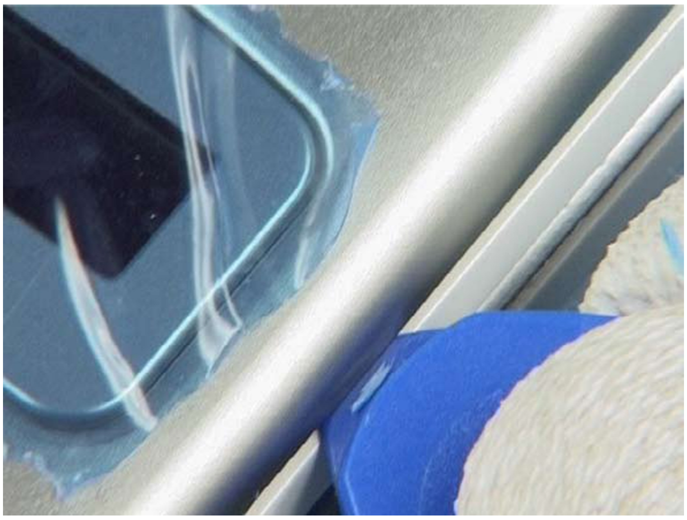
Do not use it again.



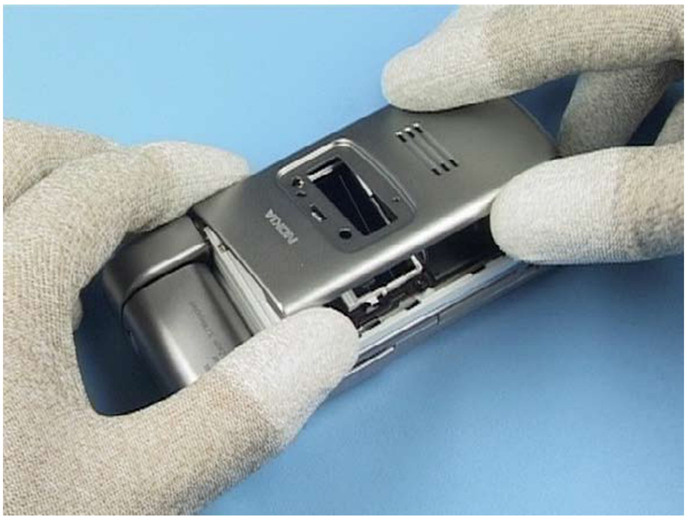
4. Undo the screw and remove it.



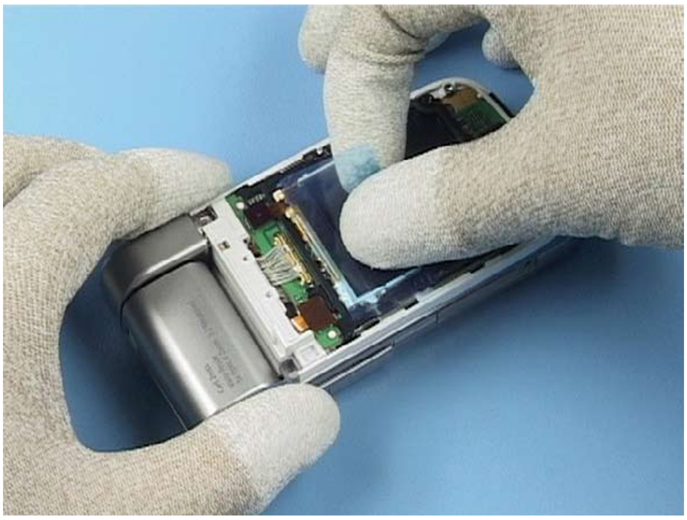
5. Slide along the sides of the Flip C-Cover Assembly, open the two clips as shown.



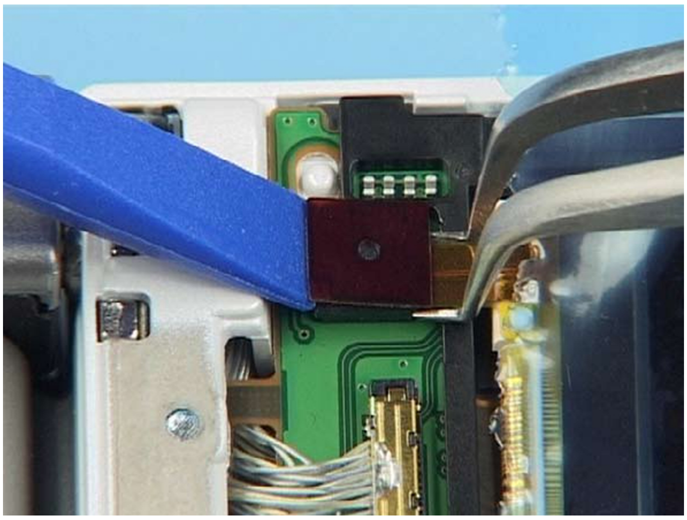
6. Remove the Flip C-Cover assembly.



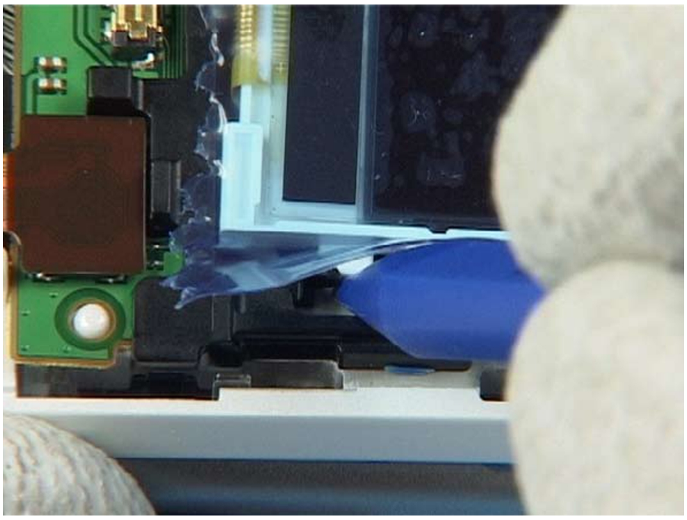
7. Protect the Sub Display with a plastic film.



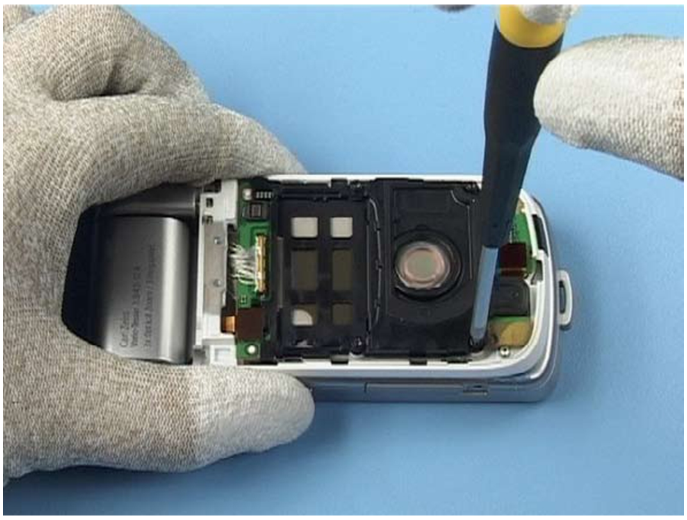
8. Carefully lever up the flex connector of the display.



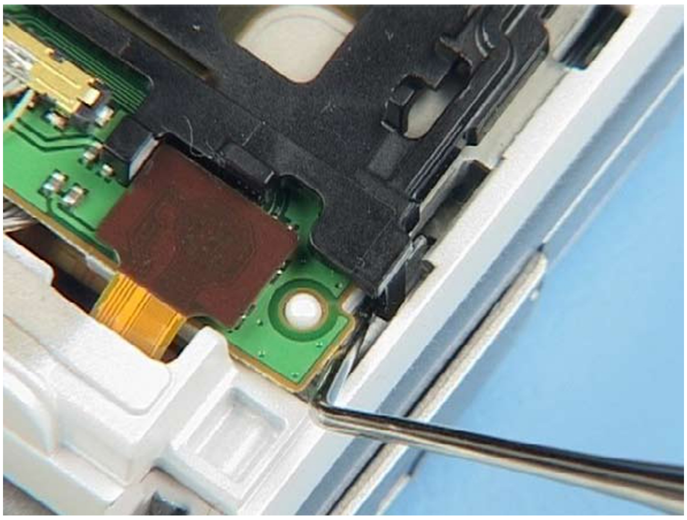
9. Gently unlock the snaps of the Sub Display



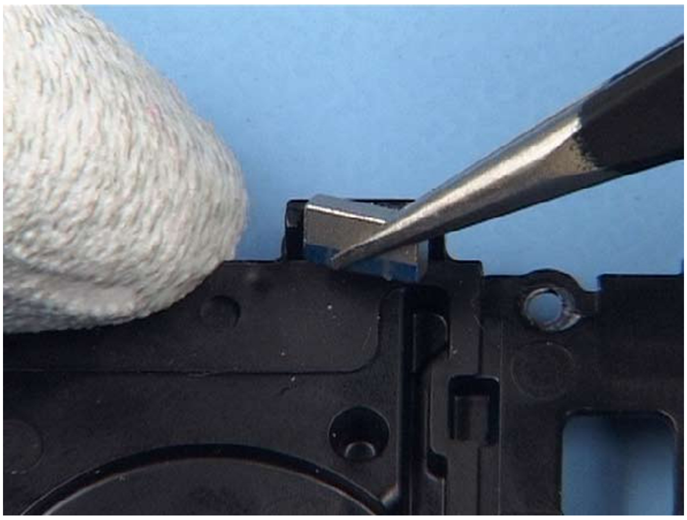
10. Unscrew the four torx plus size 6 screws and remove them.



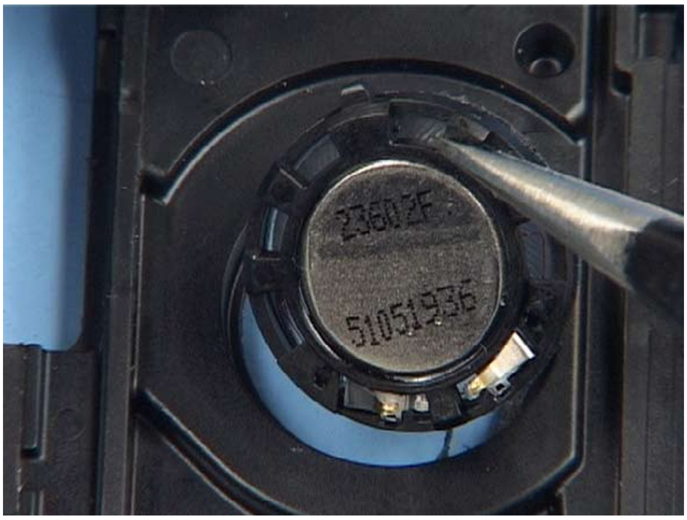
11. Unlock the plastic hooks of the Flip Frame.



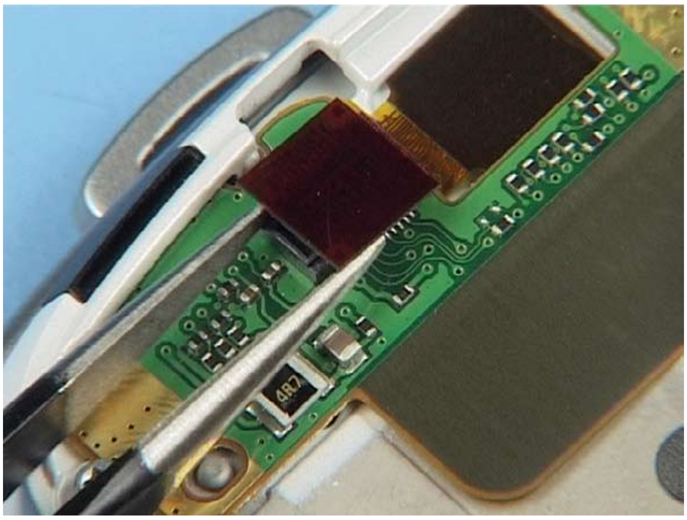
12. Remove the Magnet.



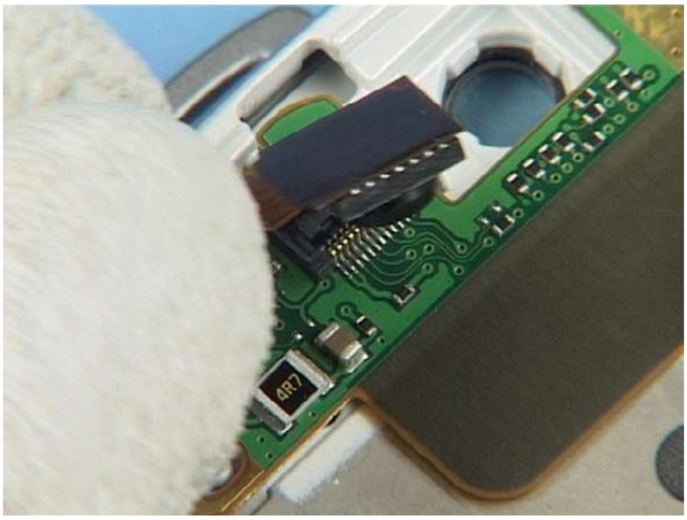
13. Lift out the glued in IHF Slim.


23602F
51051936

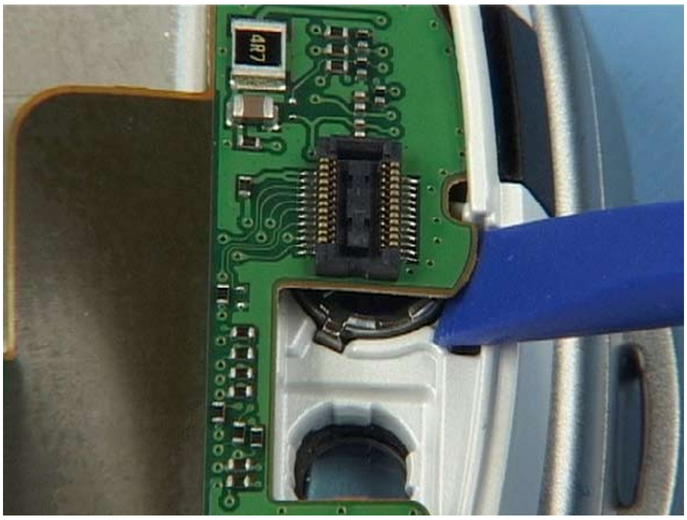
14. Carefully lever up the CIF Camera flex connector.



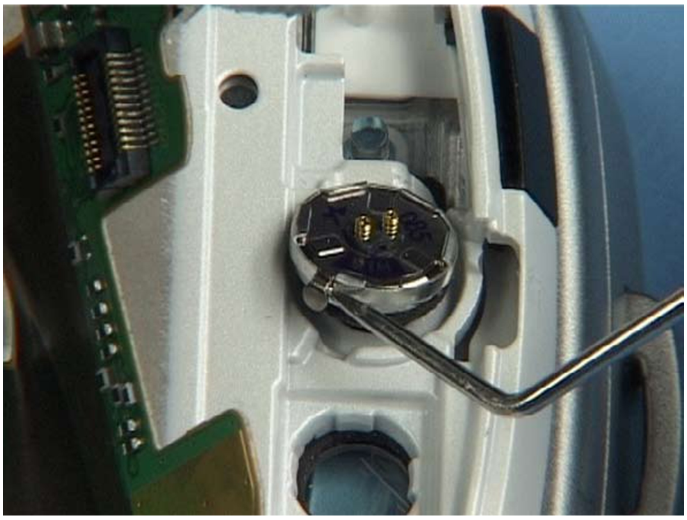
15. Remove the CIF Camera.



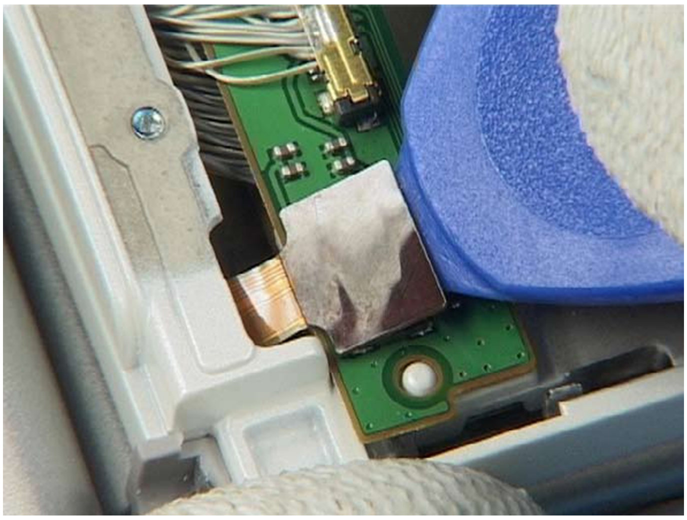
16. Lever up the Flip PWB Module.



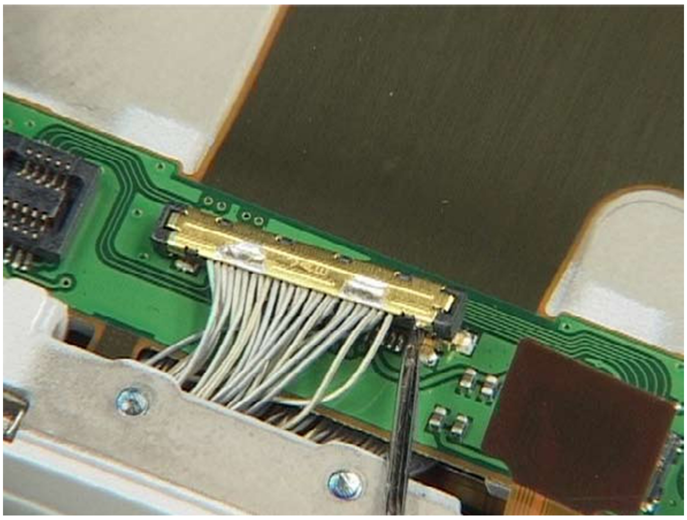
Now the glued in Earpiece can be removed easily.



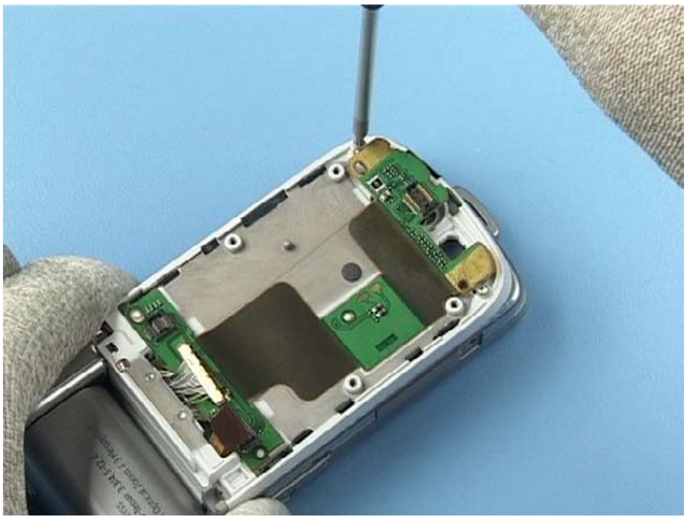
17. Open this flex connector evenly.



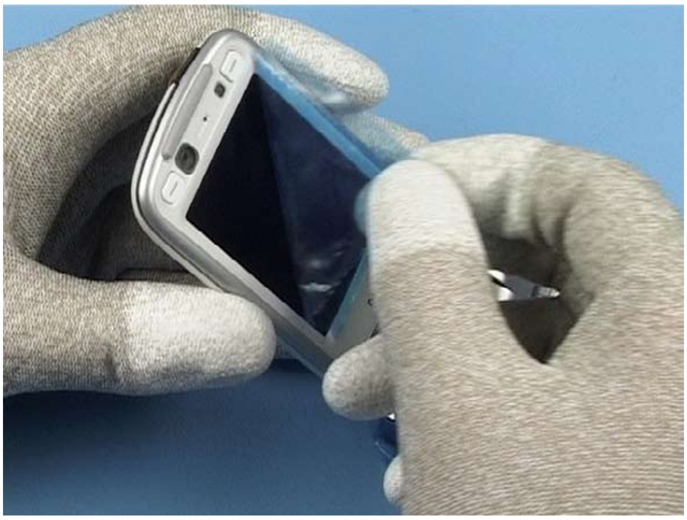
18. Gently lever up the connector with the dental pic.



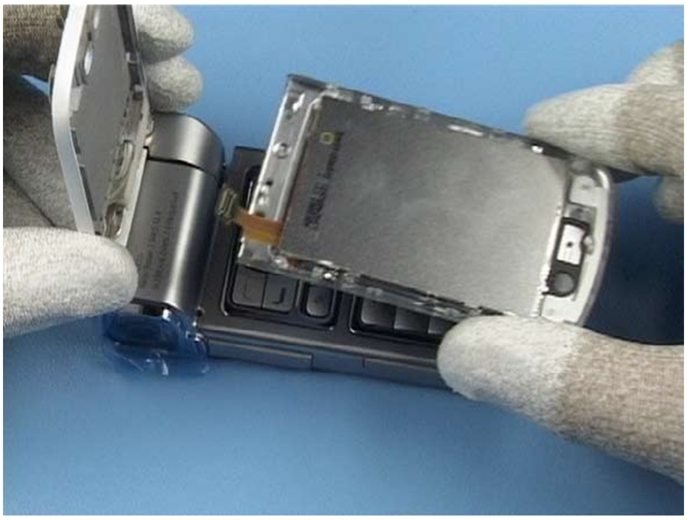
19. Undo both screws and remove them.



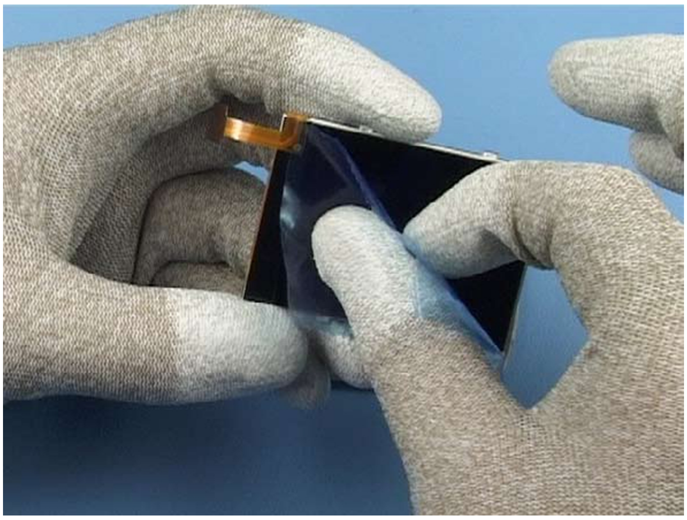
20. Open the assembly and remove the protection film.



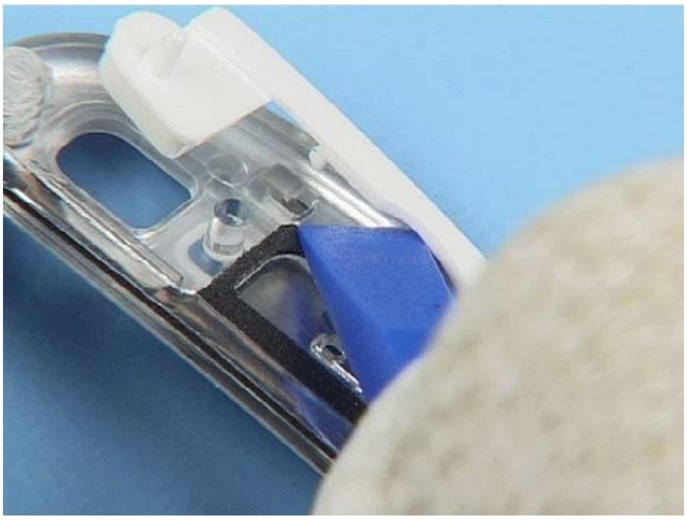
21. Push out the Flip A-Cover together with the Main Display.



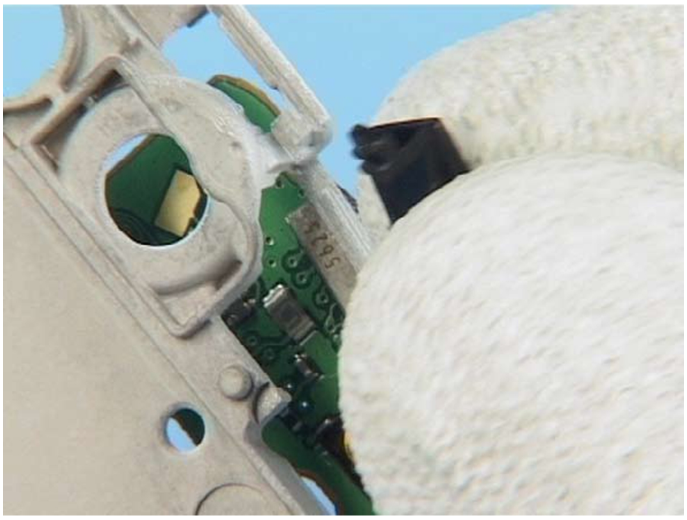
22. Protect the display with a plastic film.



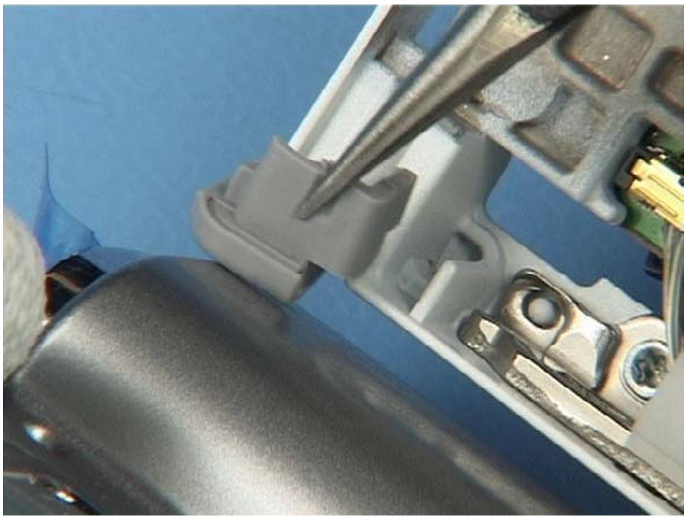
23. Carefully lever out the Flip Soft Keymat.



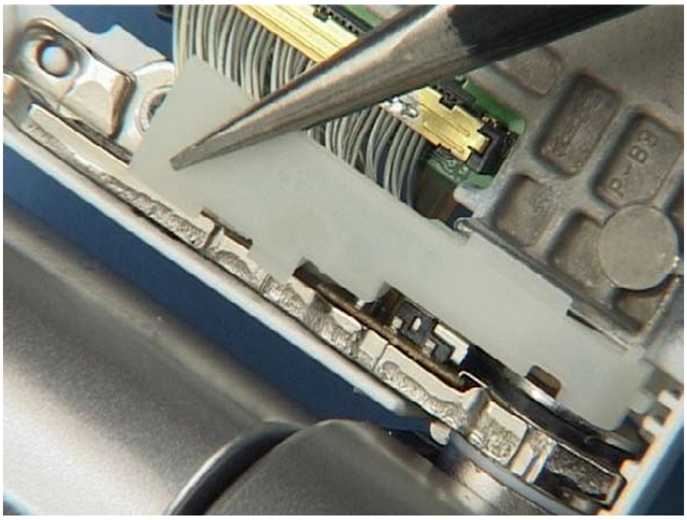
24. Remove the IR Window.



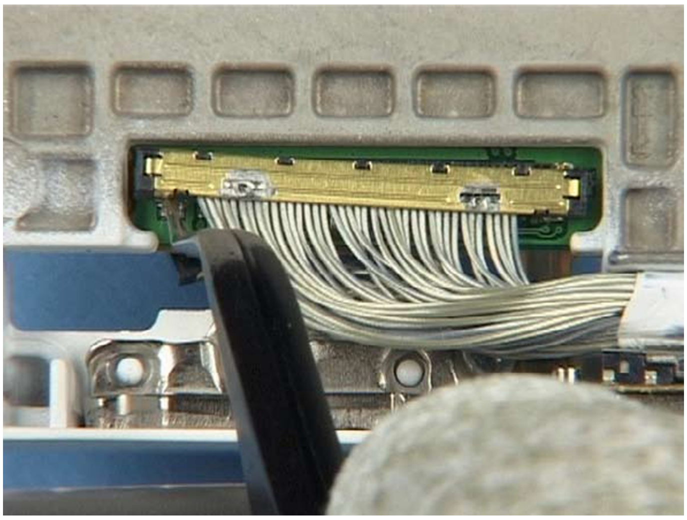
25. Pull out the Flip Corner Bumper.



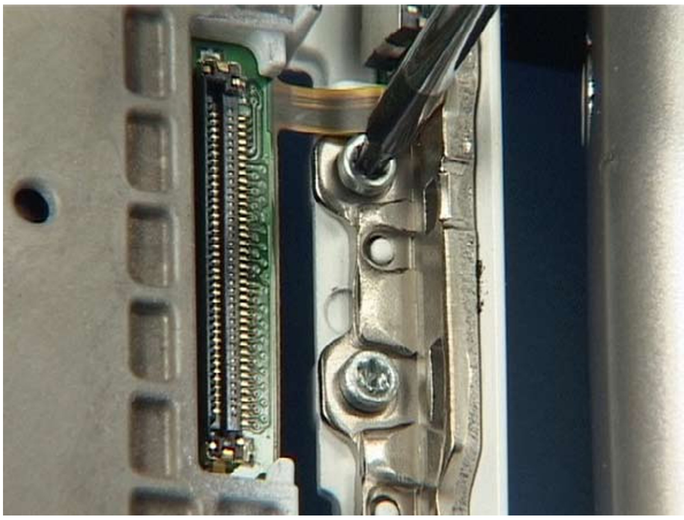
Note: Mind the cables while removing the Detector Holder with tweezers.



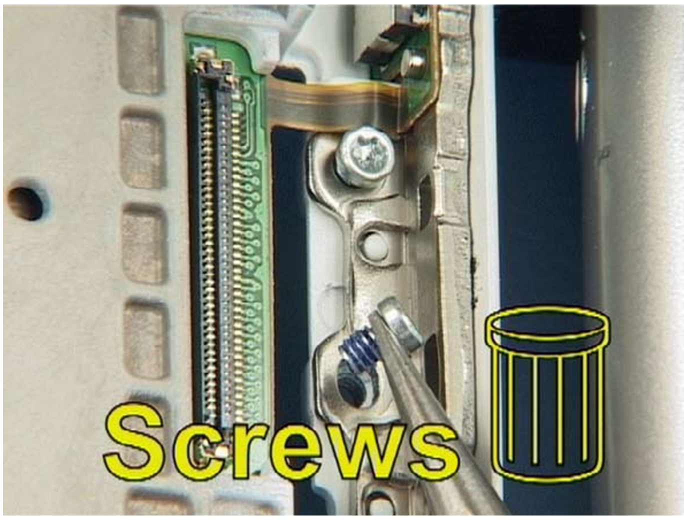
26. Use the angled tweezers for levering out the connector as shown.



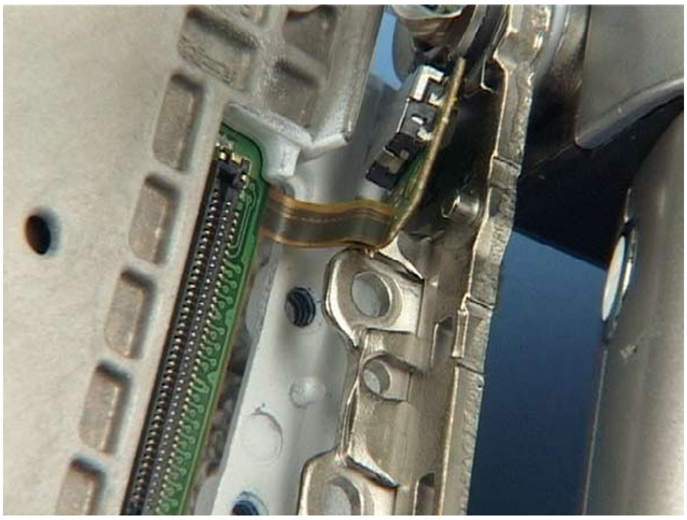
27. Unscrew both torx size 6 screws and discard them.



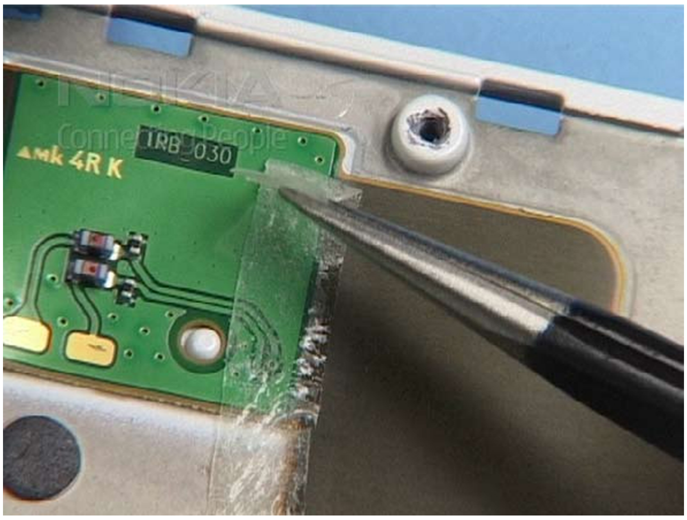
Note: Always use new screws for reassembly.



28. Carefully separate the parts, mind the switch of the Flip PWB Module.

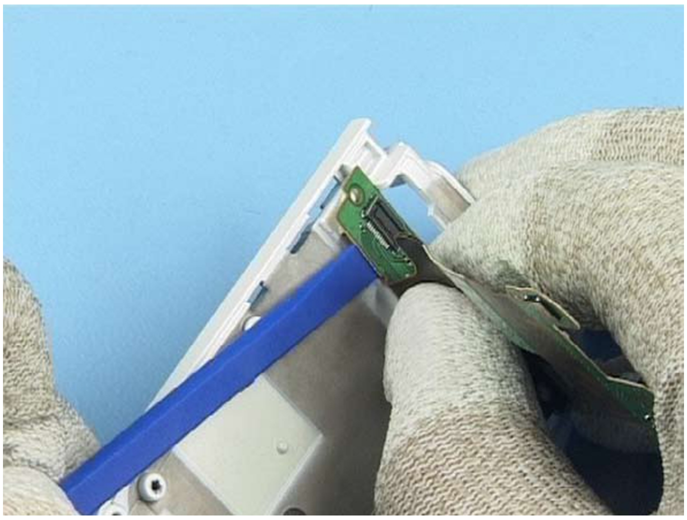


29. Peel off the Flip Frame Adhesive Tape with tweezers.

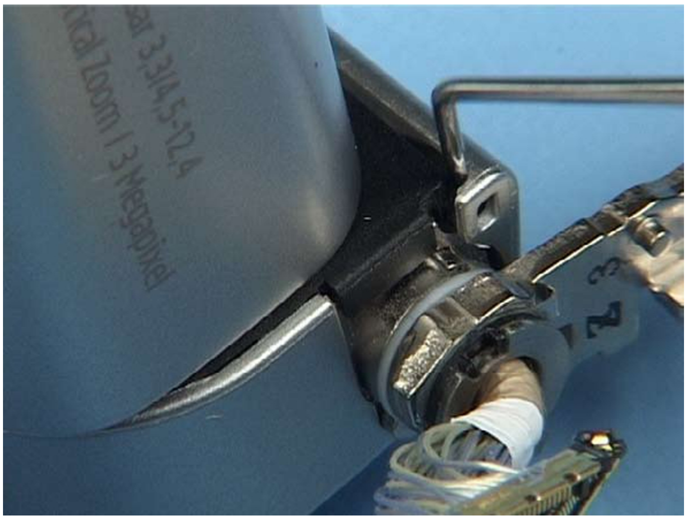


30. Ensure that no residues remain.

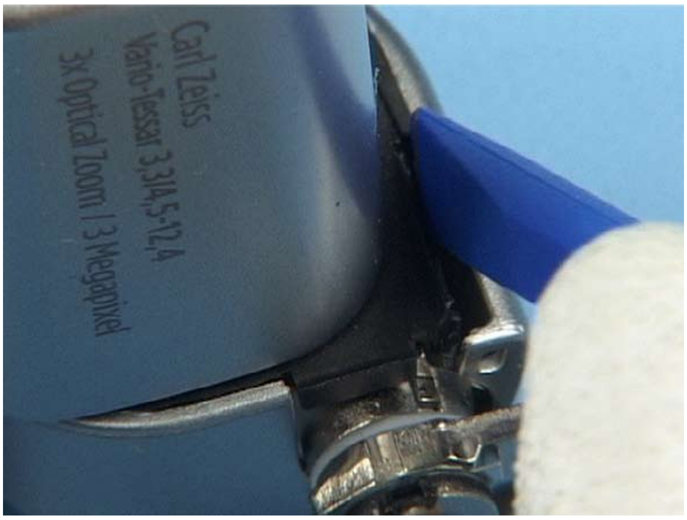
31. Gently peel up the glued Flip PWB Module with the SS-93.



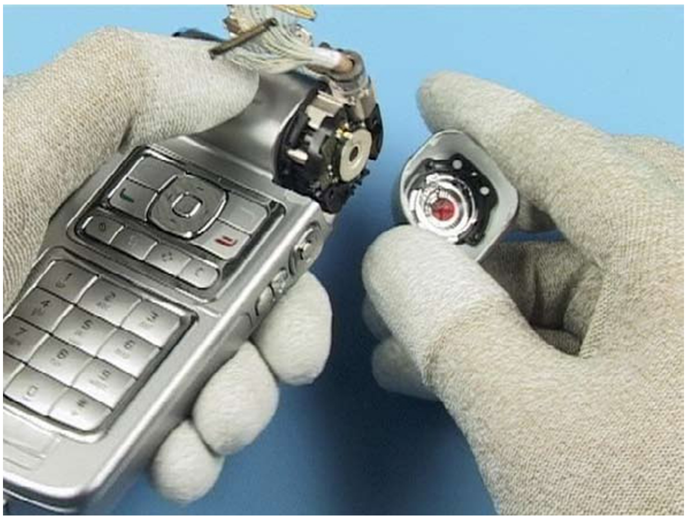
32. Release the latches of the Capture Key Cover Module.



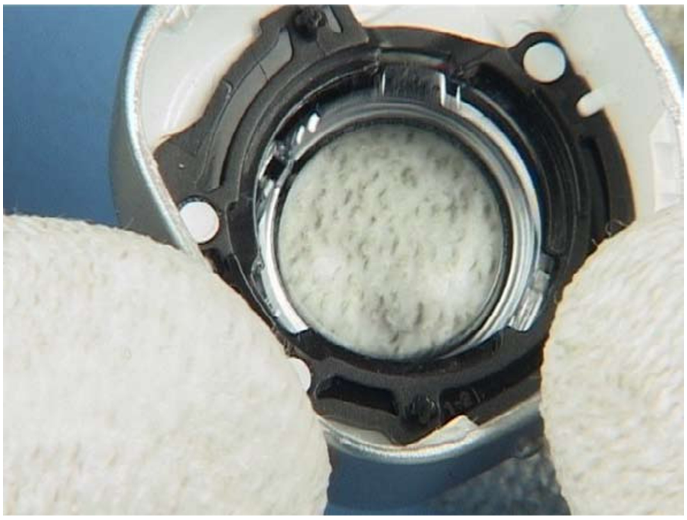
33. Use the SS-93 to unlock all snaps.


Carl Zeiss
Vario-Tessar 3.3/4,5-12,4
3x Optical Zoom | 3 Megapixel

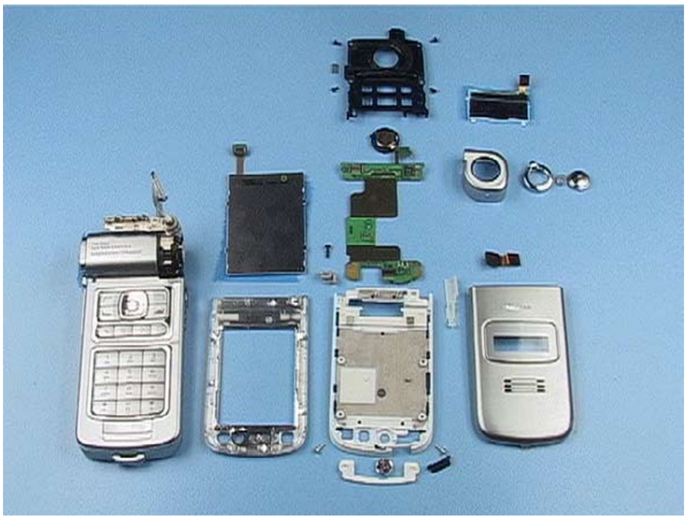
Now the Capture Key Cover Module can be removed easily.



34. Remove the Capture Key Button, Spring and the Zoom Key Lever.



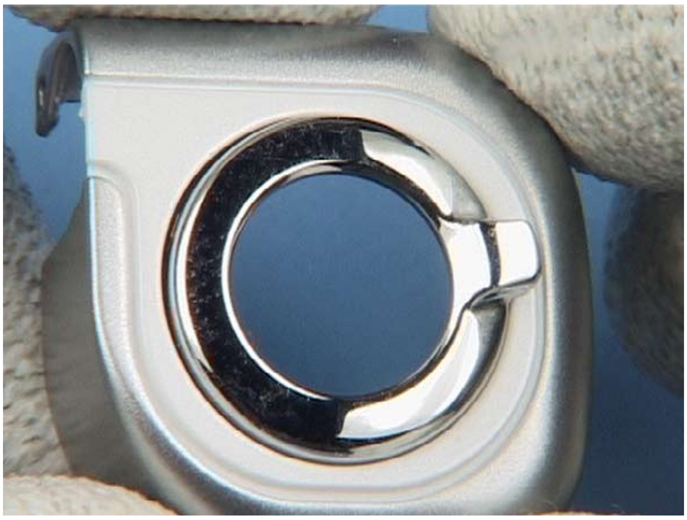
Now the disassembly procedure is complete.



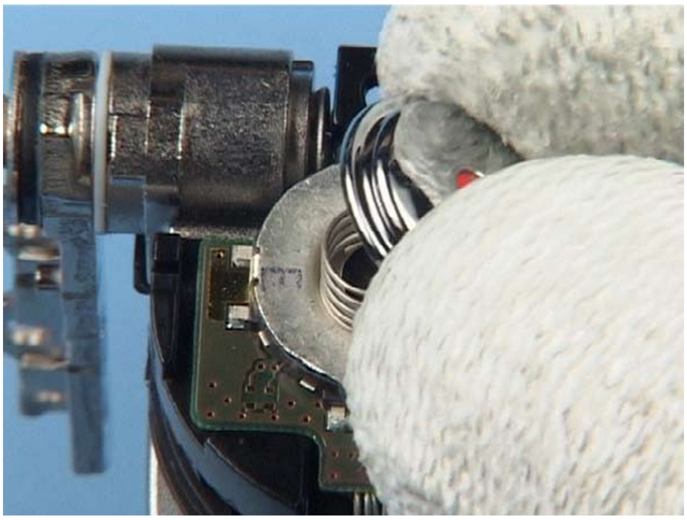
Upper block reassembly

Steps

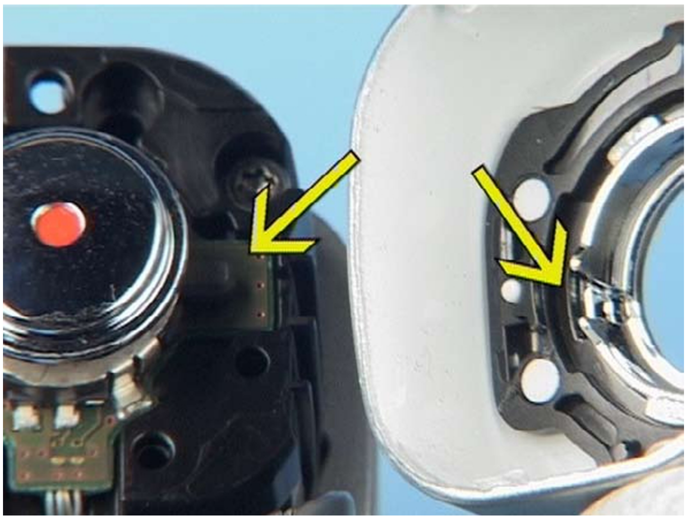
1. Align the Zoom Key Lever into the Capture Key Cover Module as shown.



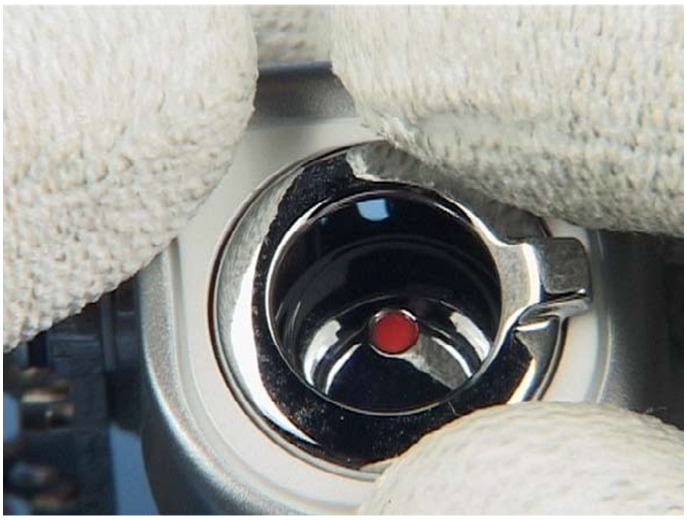
2. Place the spring and the Capture Key Button.



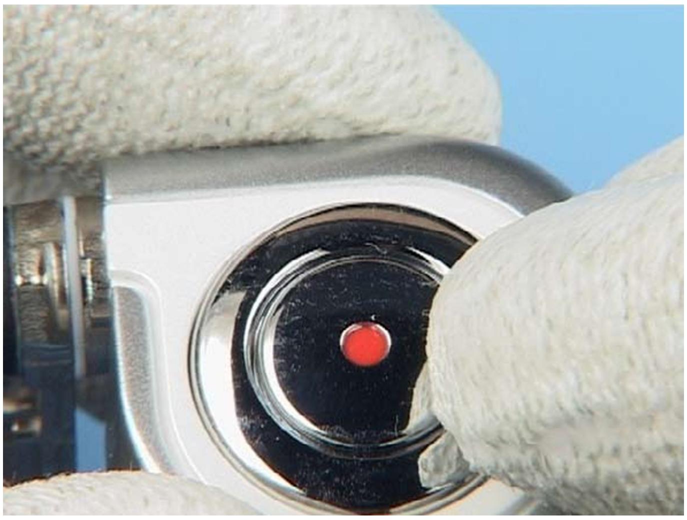
3. Set the recess of the Zoom Key Lever in position shown.



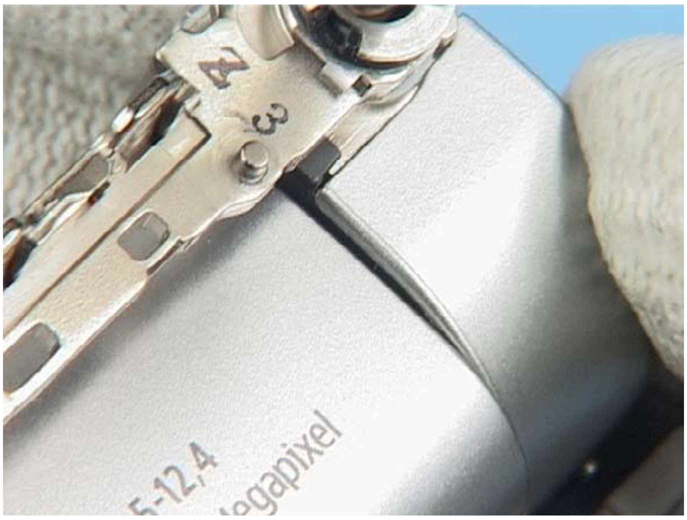
4. Position the Capture Key Cover Module and press it down quickly.



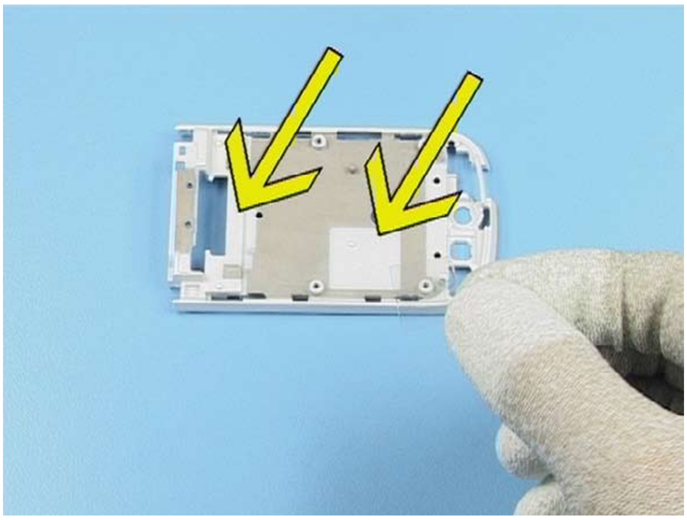
5. Check the functionality of the Zoom Key Lever before continue.



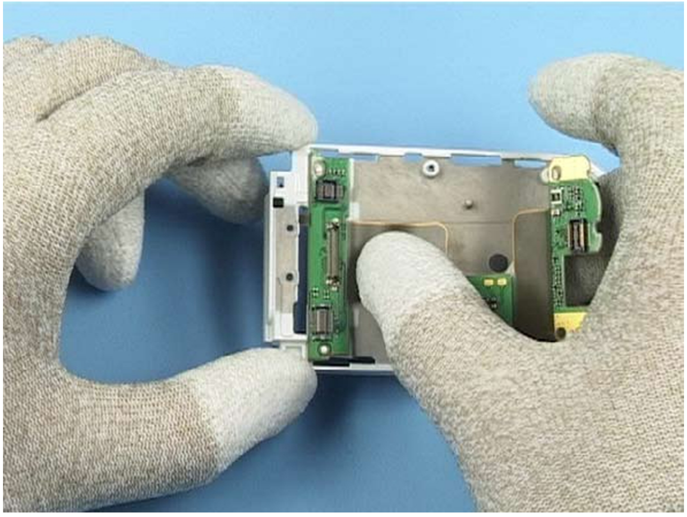
6. Now push the cover into the correct position.



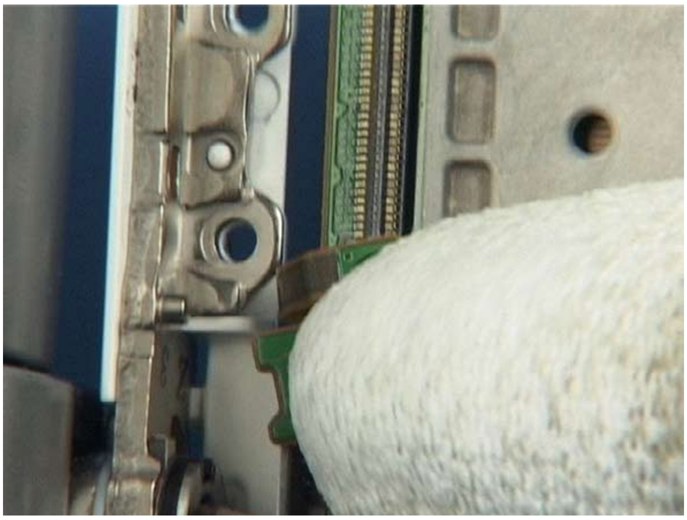
7. Use new adhesives before placing the Flip PWB Module.



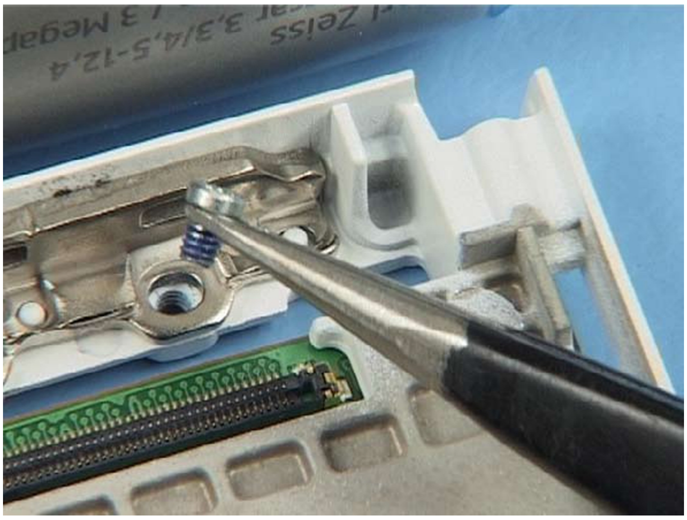
8. Align the Flip PWB Module to the guides and smooth it down evenly.



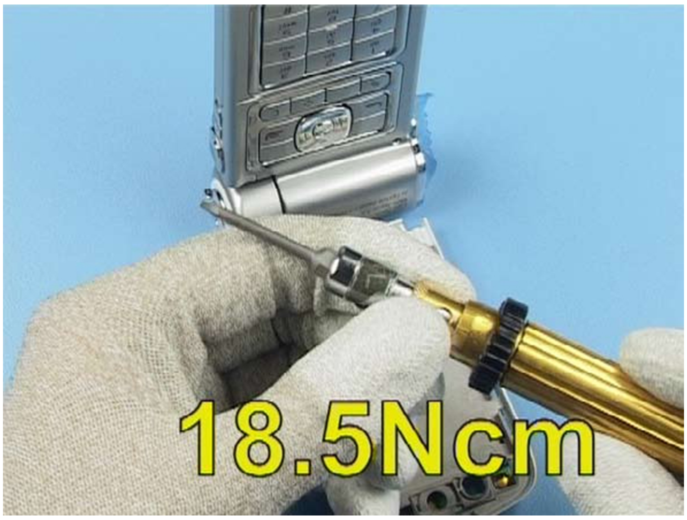
9. Hold the switch in position shown and align the hinge over the Flip B-Cover.



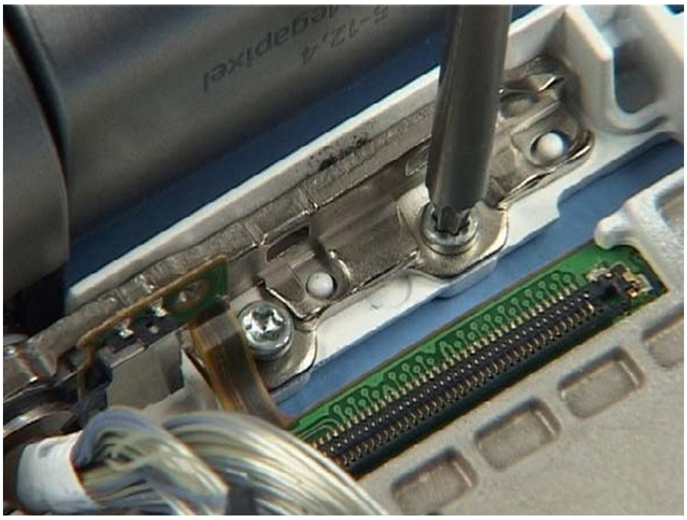
10. Insert two new screws.



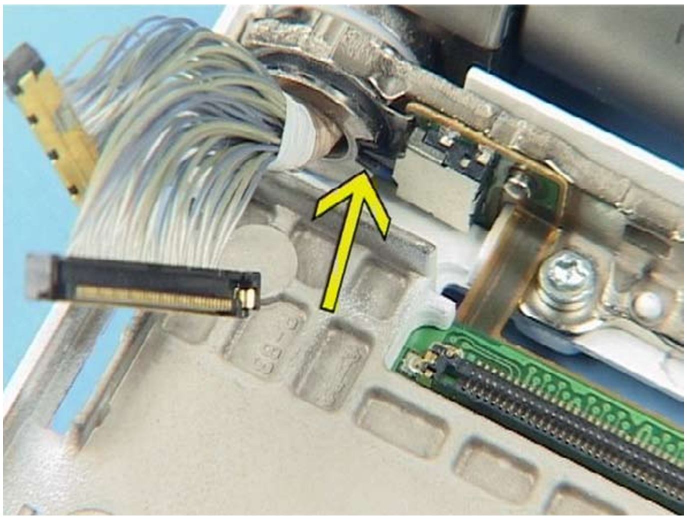
11. Fit the torx size 6 bit and set the correct torque.



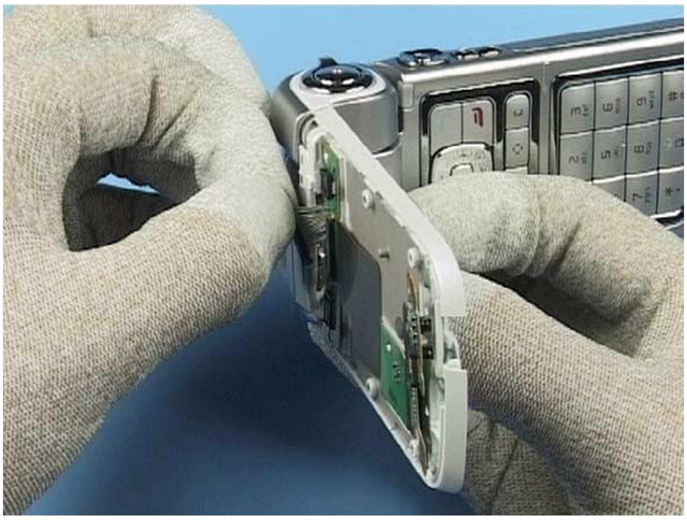
12. Apply the torque to both screws.



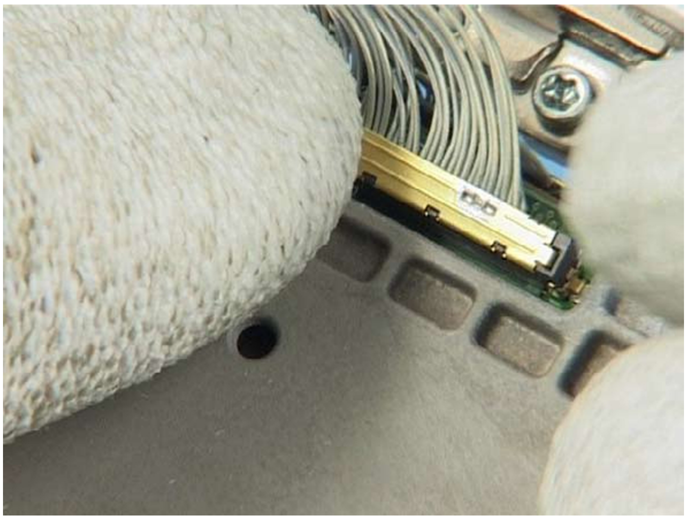
13. Place the switch in position shown.



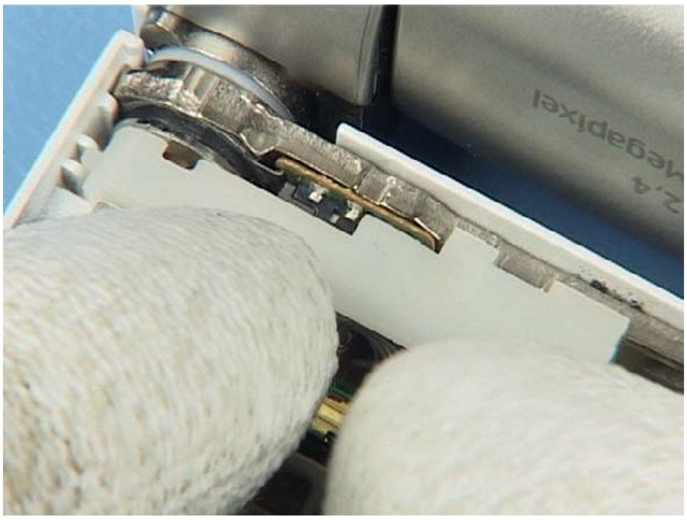
14. Slot the smaller connector through the Flip B-Cover.



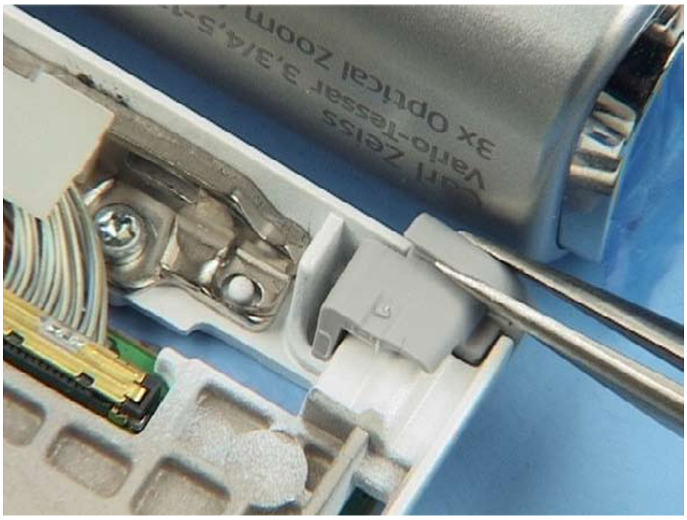
15. Close the connector while pushing from behind the Flip PWB Module.



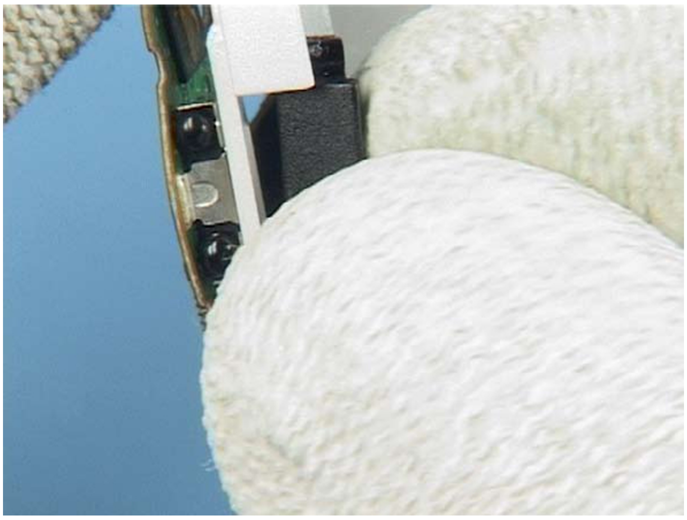
16. Place the Detector holder.


2,4
Megapixel

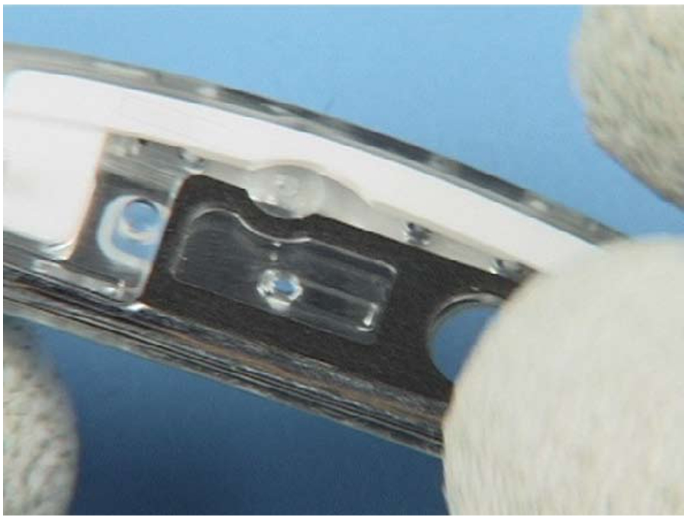
17. Insert the Flip Corner Bumper.


Carl Zeiss
Vario-Tessar
3x Optical zoom

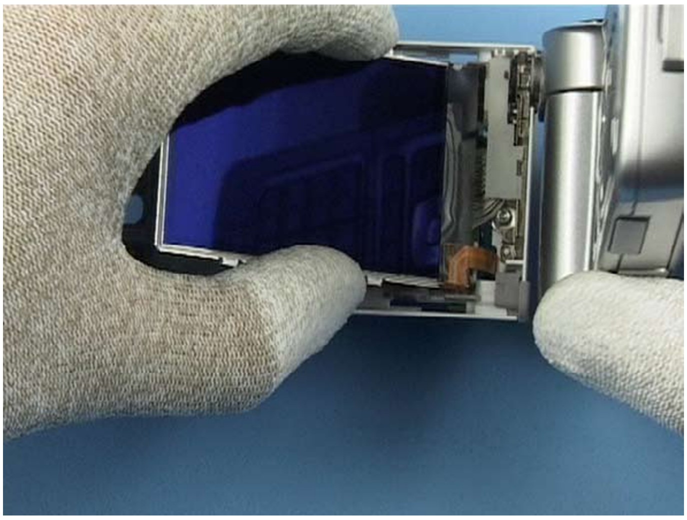
18. And the IR Window.



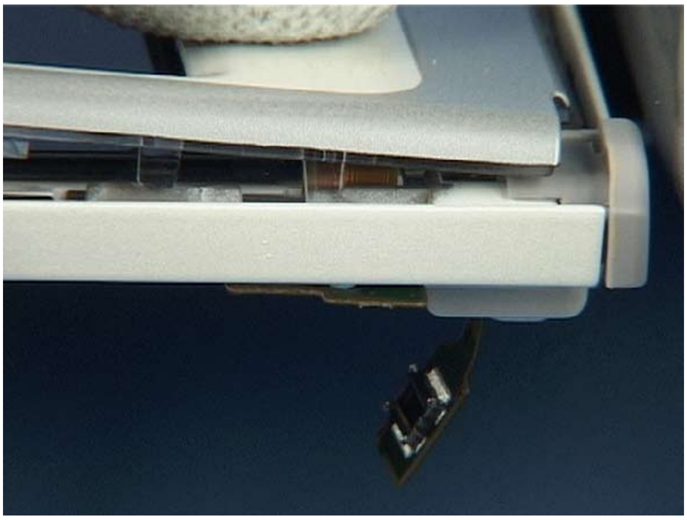
19. Carefully place the Flip Soft Keymat. The snaps are very delicate and can break easily.



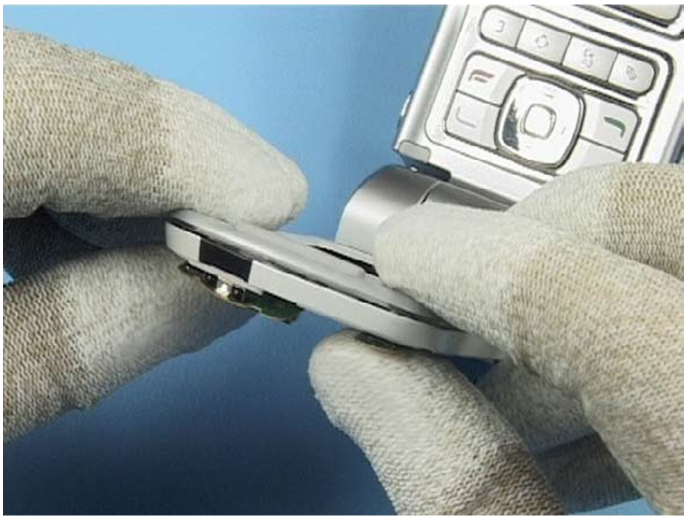
20. Remove the protection film from the Main Display. Slot the flex foil through the Flip B-Cover.



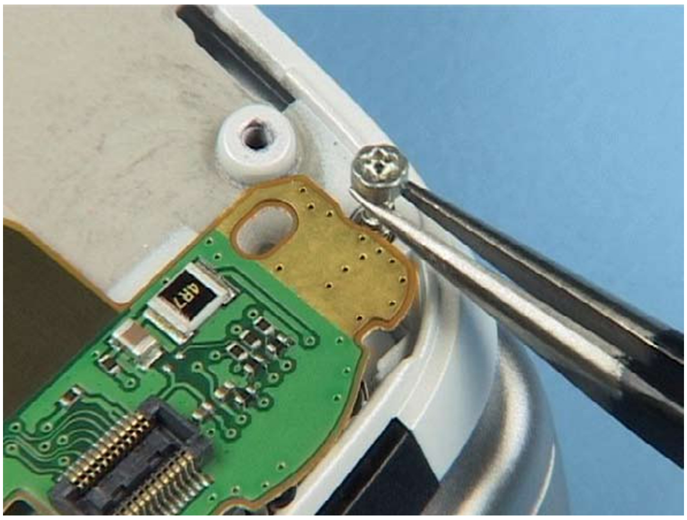
21. Fit the Flip A-Cover Assembly, beginning from the bottom side.



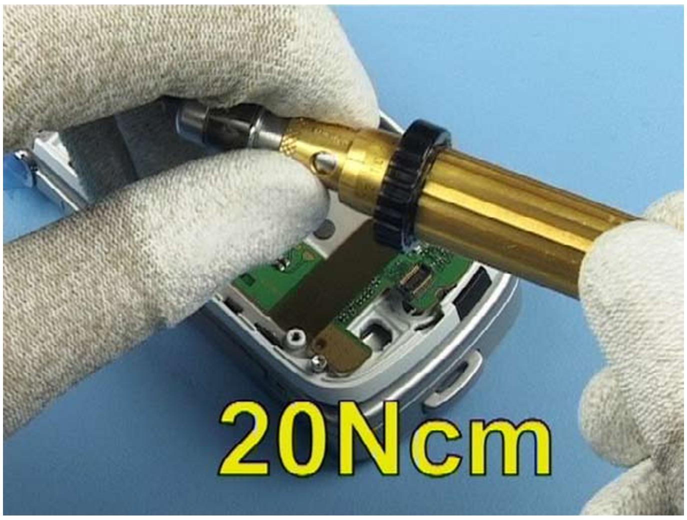
22. Click all snaps into their places.



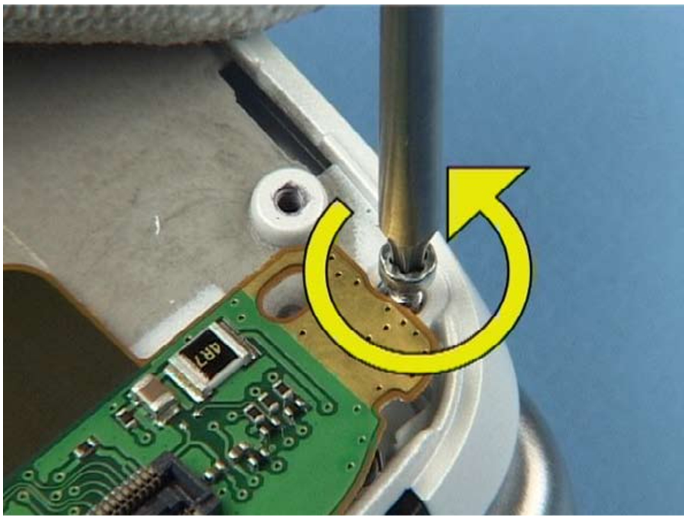
23. Close the assembly. Insert both screws.



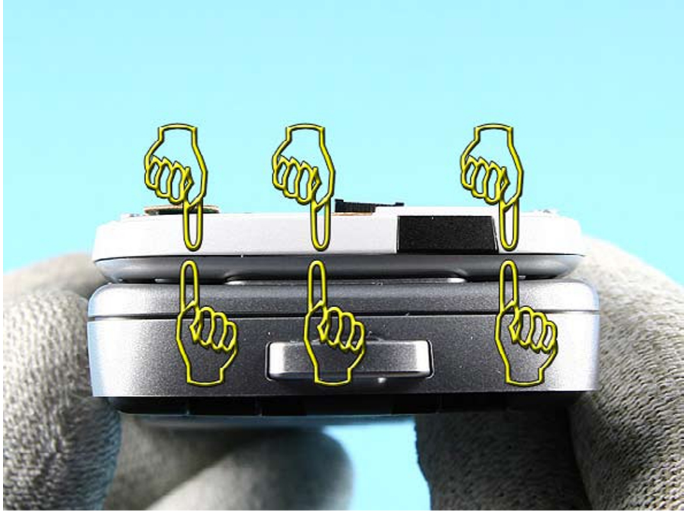
24. Set the correct torque.



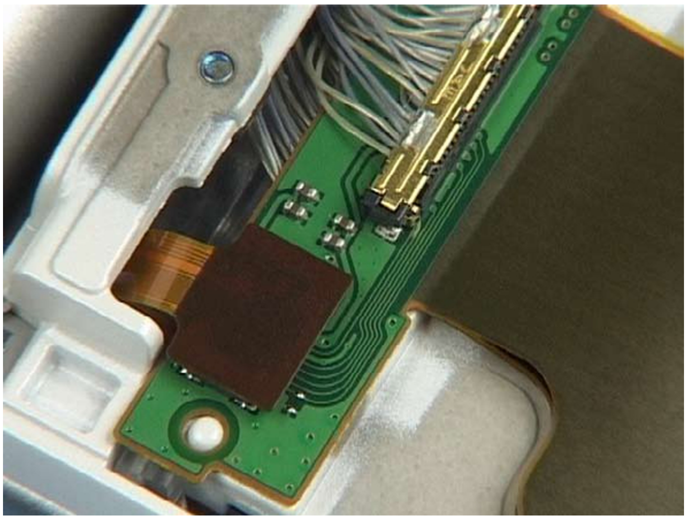
25. To prevent destroying the plastic threats, turn the screws left first, then tighten them with the correct torque.



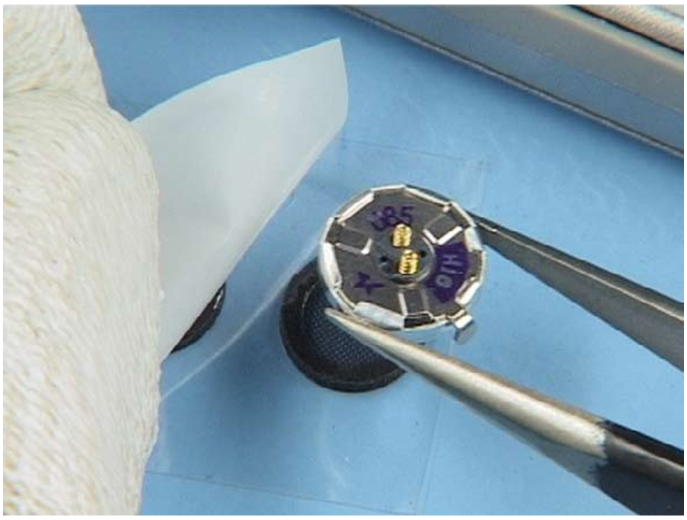
26. Check if there is no gap remaining between Flip A-Cover Assy and Flip B-Cover.



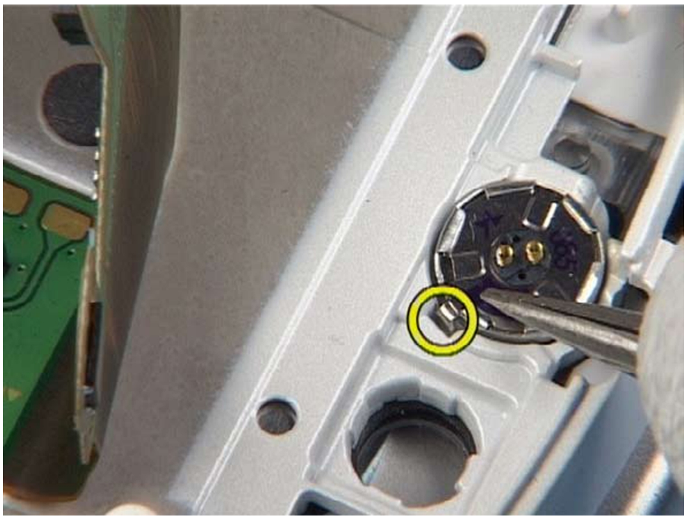
27. Close the connectors.



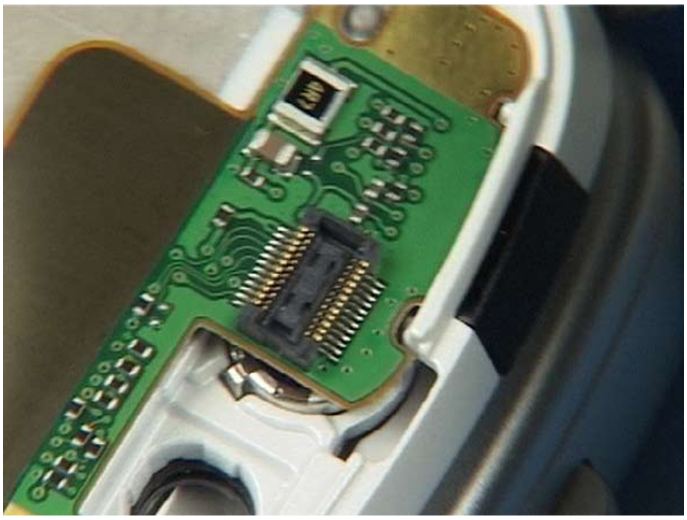
Note: Always use a new Gasket when replacing the Earpiece.



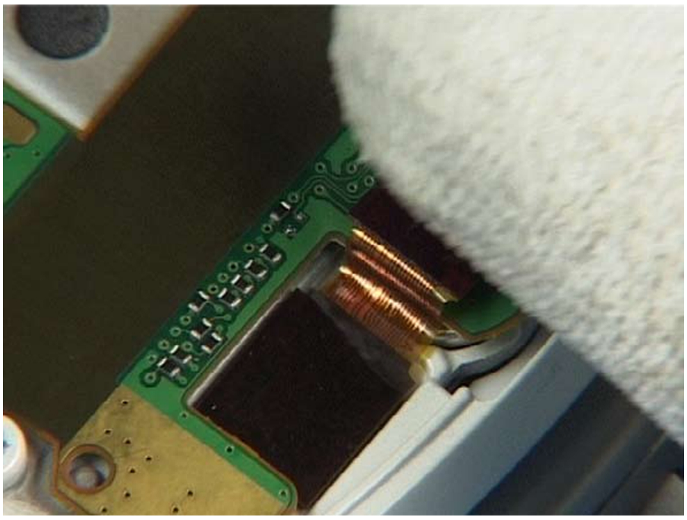
28. Mind the alignment tap of the Earpiece.



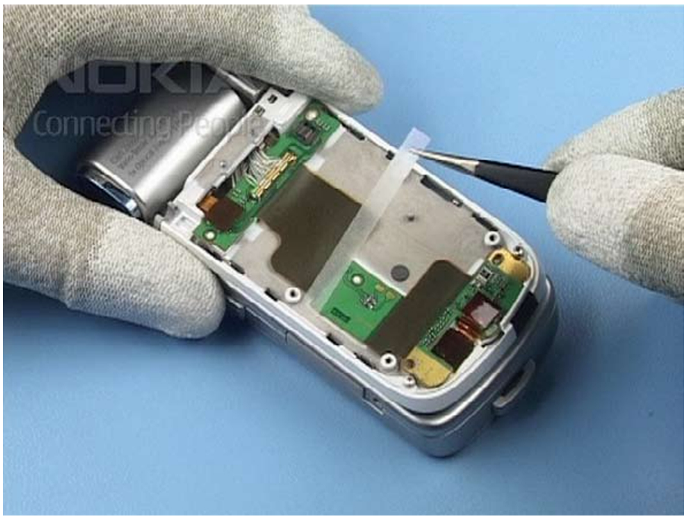
29. Gently fit the Flip PWB Module.



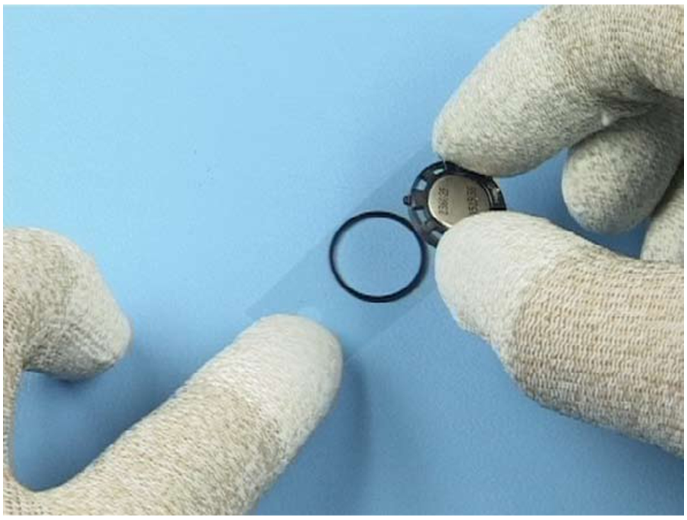
30. Insert the CIF Camera, close the connector.



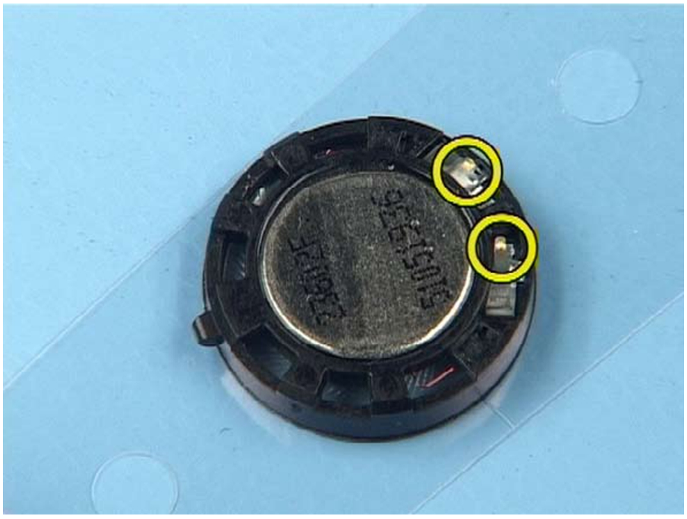
31. Stick a new Flip Frame Adhesive Tape. Smooth it down evenly and remove the protection film.



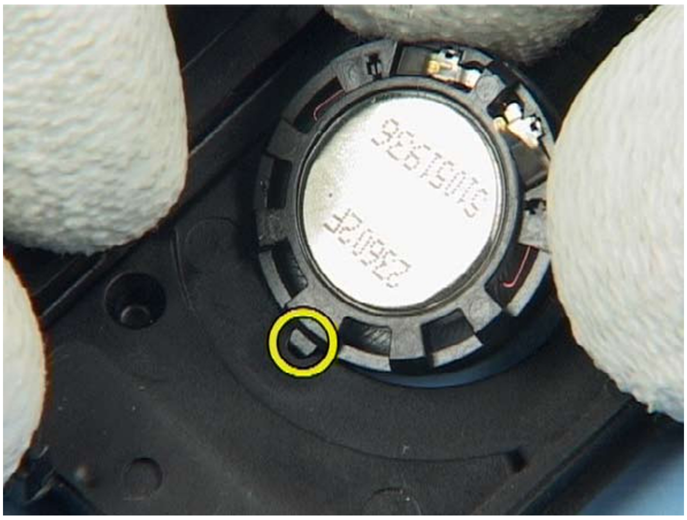
Use a new Gasket when replacing the IHF Speaker.



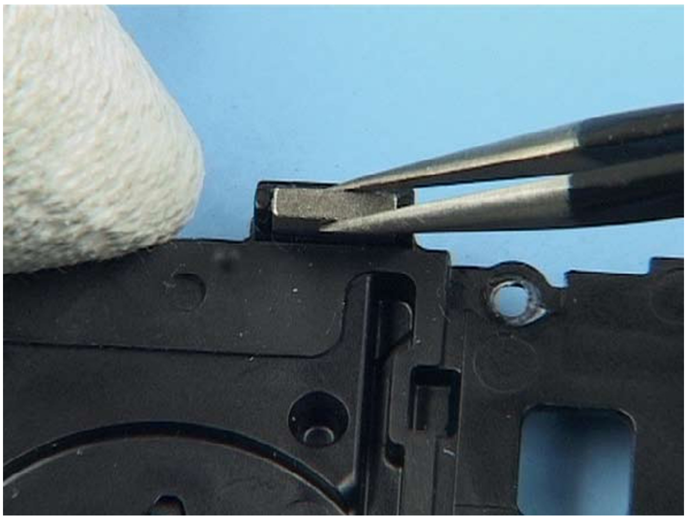
32. Mind the spring contacts while handling the IHF Speaker.



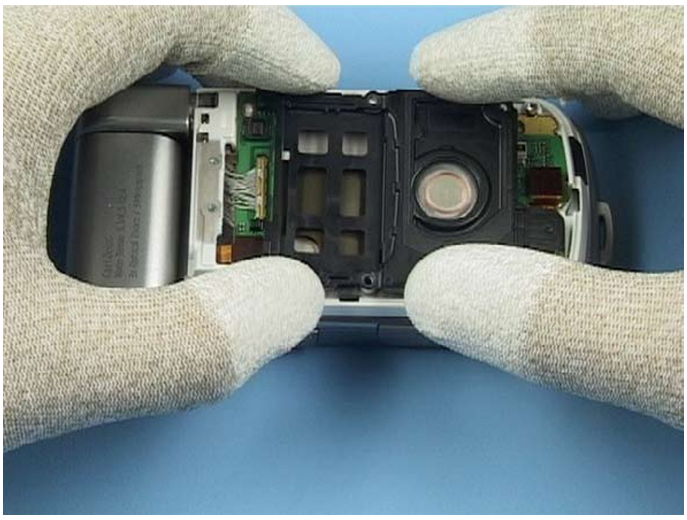
Note: Note the alignment tap while positioning the IHF Speaker.



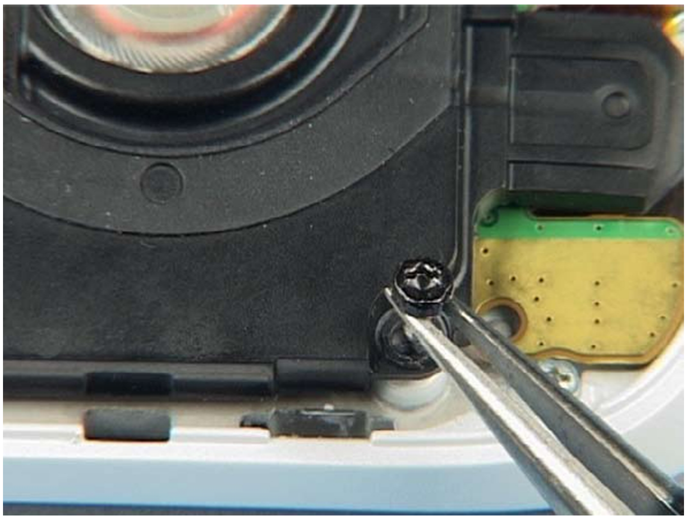
33. Insert the Magnet.



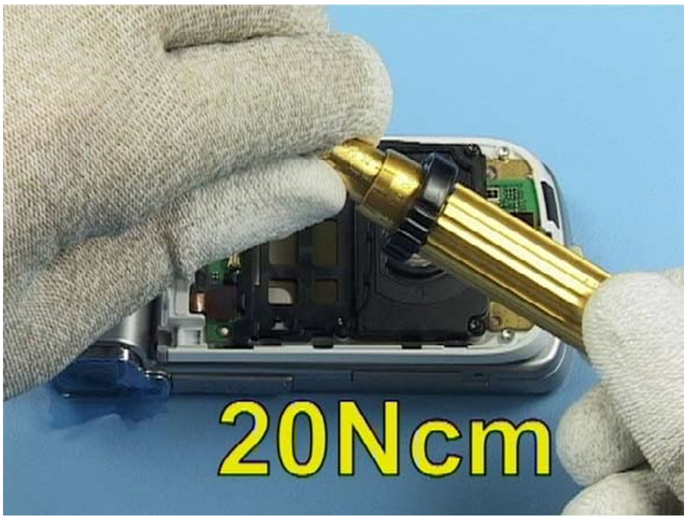
34. Place the Flip Frame, mind the correct positioning.



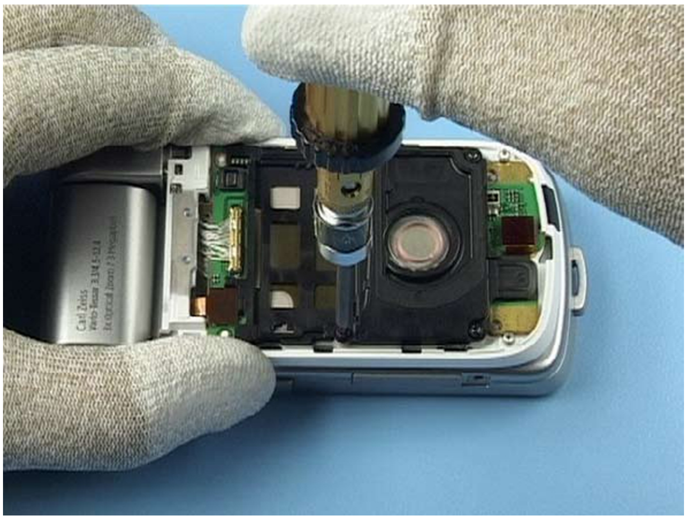
35. Insert the screws.



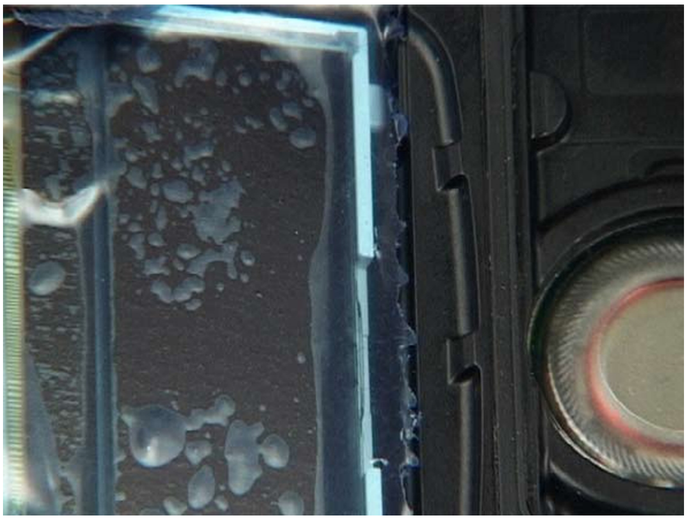
36. Set the correct torque.



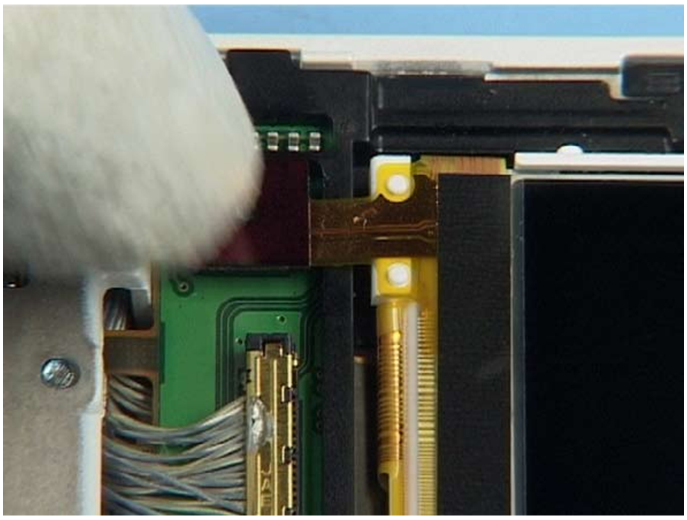
37. Tighten the four screws.



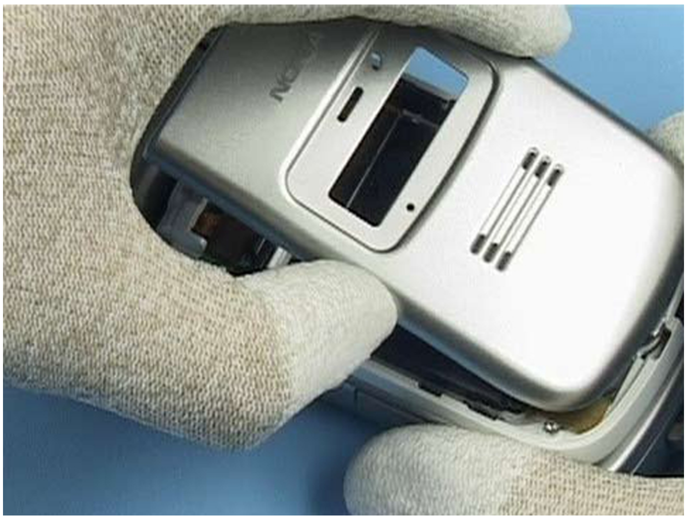
38. Insert the SUB Display.



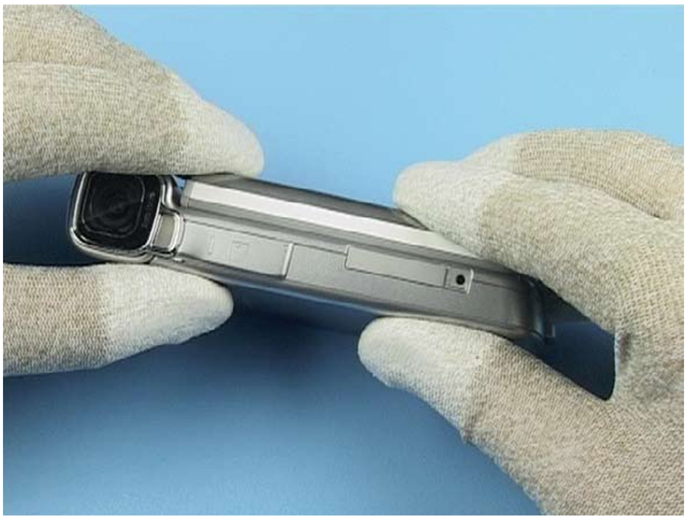
39. Close the connector.



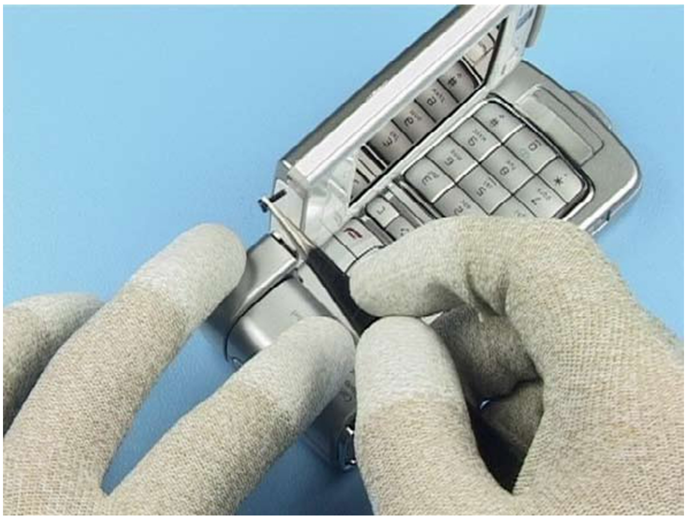
40. Place the Flip C-Cover, beginning from the top.



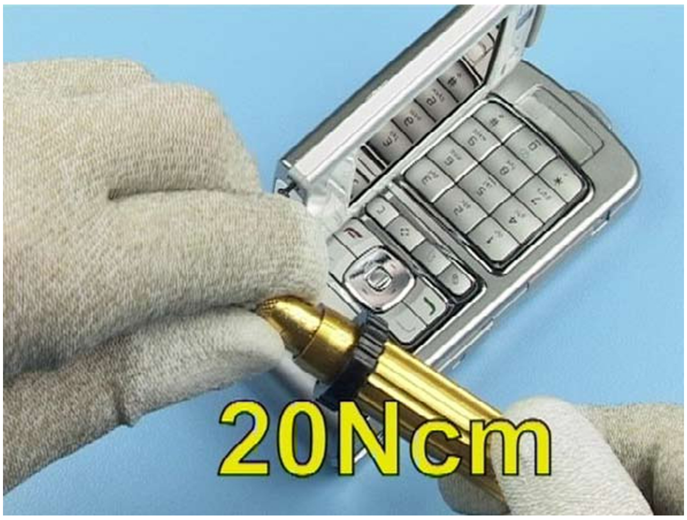
41. Push it down evenly.



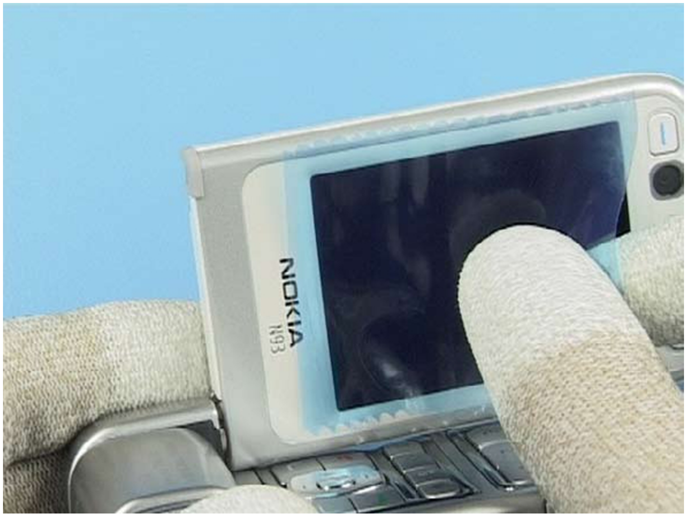
42. Insert the screw.



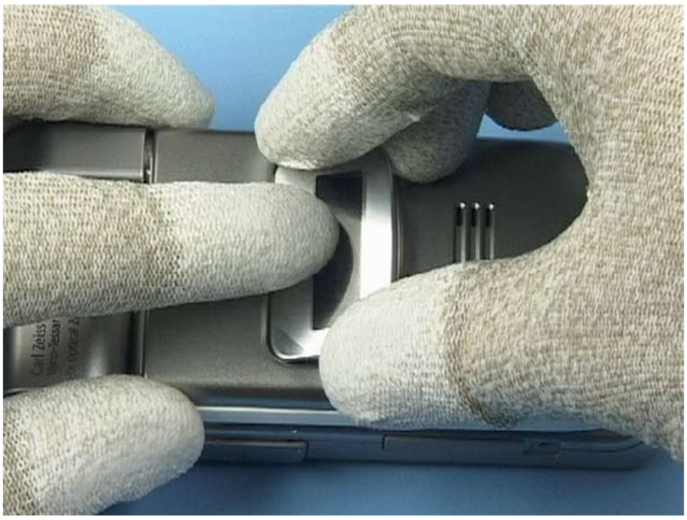
43. Tighten it with the correct torque.



44. Cover the Main Display with a plastic film.



45. Place a new Sub Display Window, smooth it down evenly.



Lower block disassembly

Prerequisites

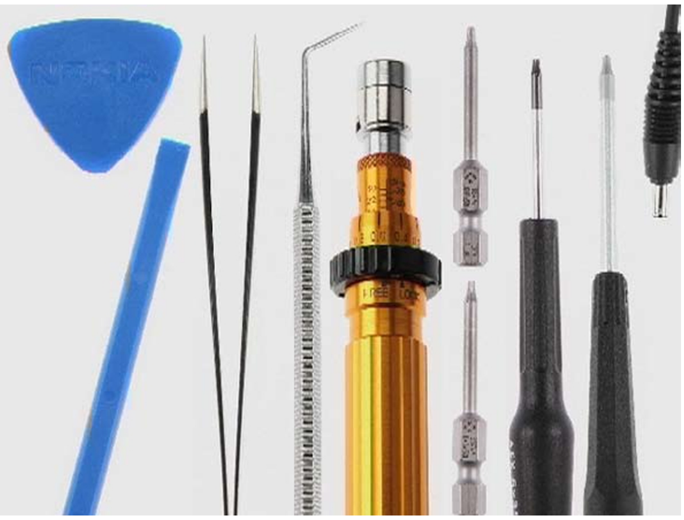
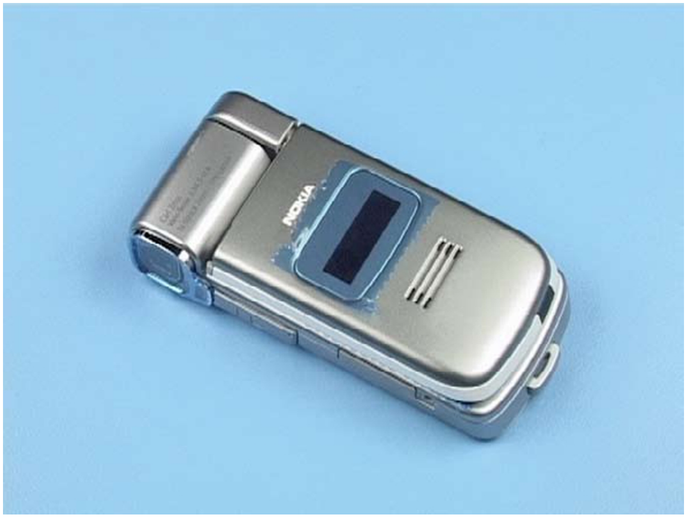


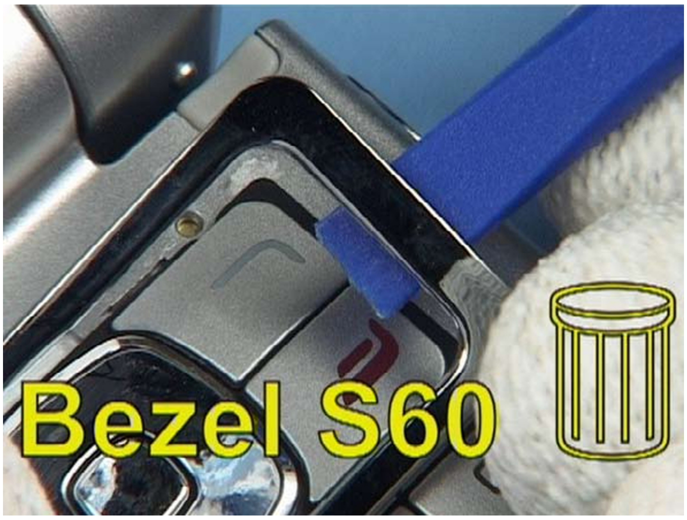
Figure 38 Needed tools: SRT-6,SS-93, metal tweezers, a dental pic, the torque driver with a torx plus and a torx size 6 bit, a torx plus and a torx driver size 6 and a DC plug.

Steps

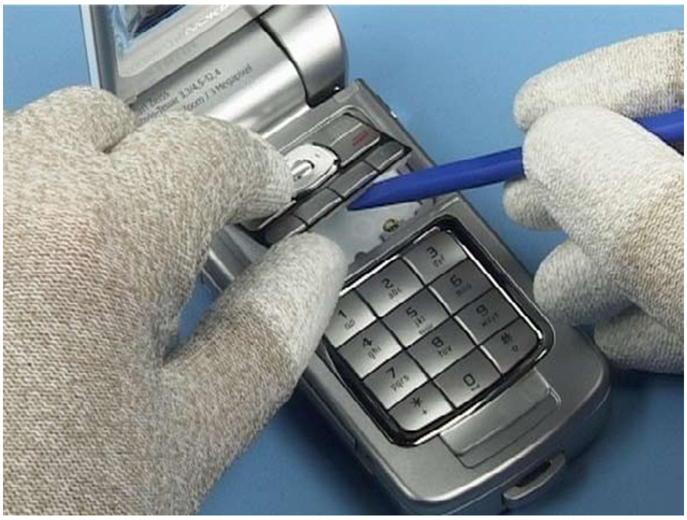
1. Cover all windows with a plastic film. Remove the battery if it is inserted.



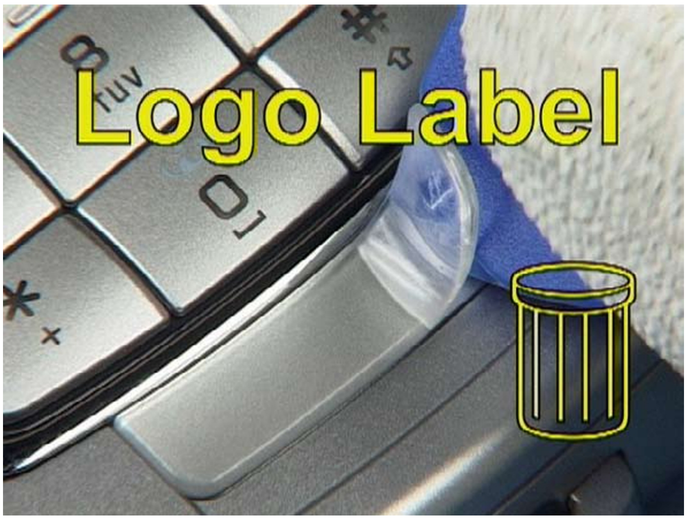
2. Carefully pry open the Bezel S60 with the SRT-6 and remove it. Do not use it again.



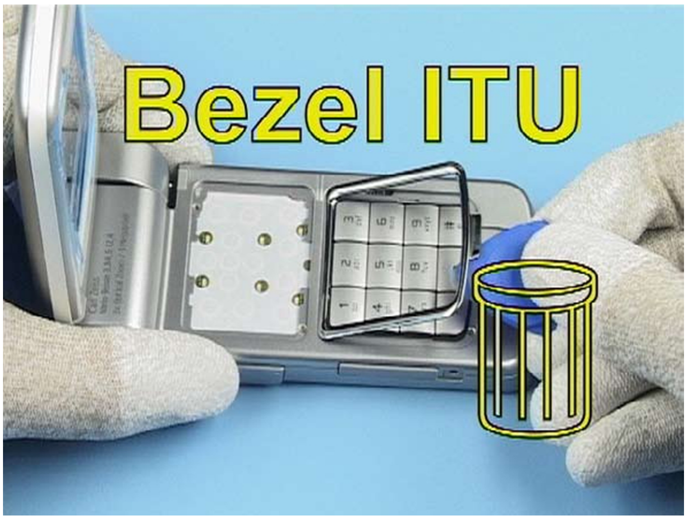
3. Lever out the Keymat S60.



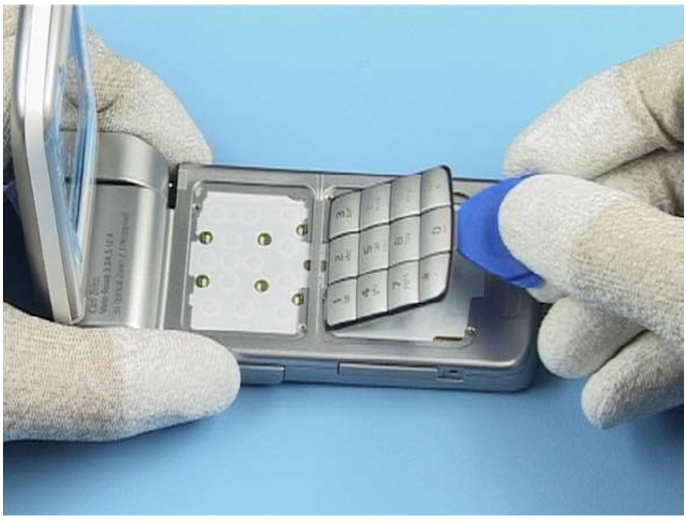
4. Release the adhered Logo Label with the SRT-6.



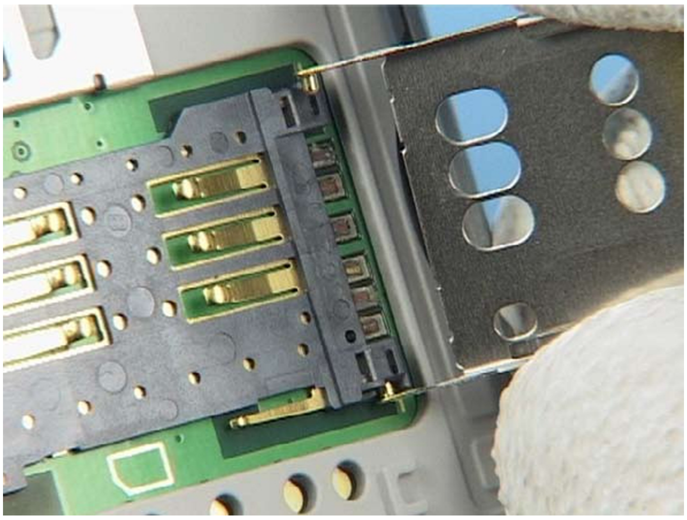
5. Carefully lift up the glued in Bezel ITU. Do not use it again.



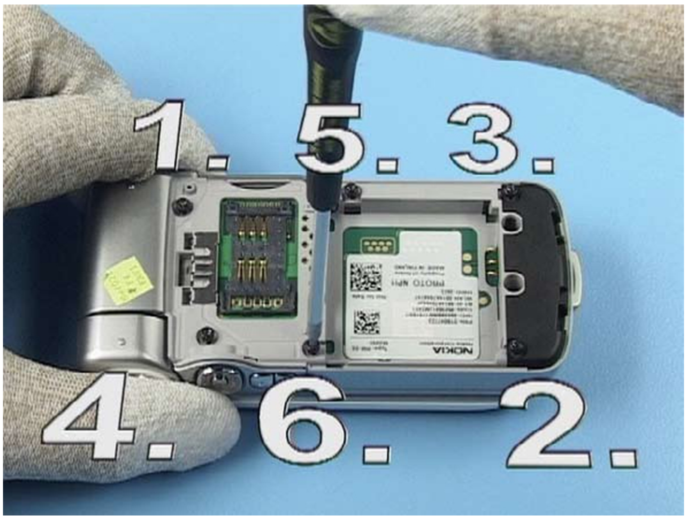
6. Remove the Keymat.



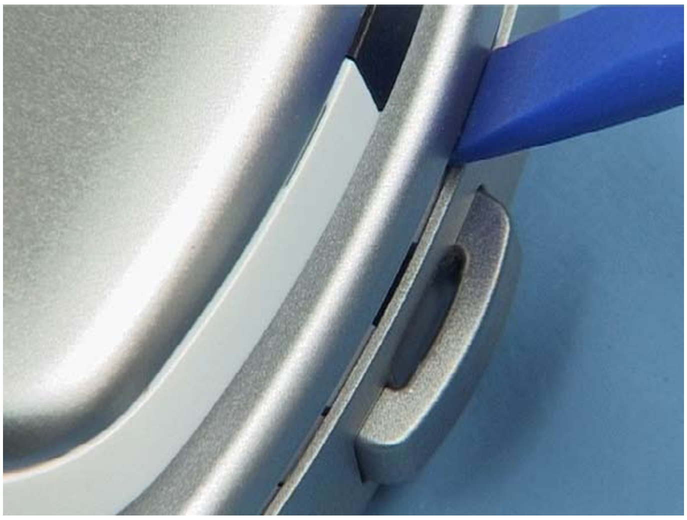
7. Open the SIM Flap and remove it as shown.



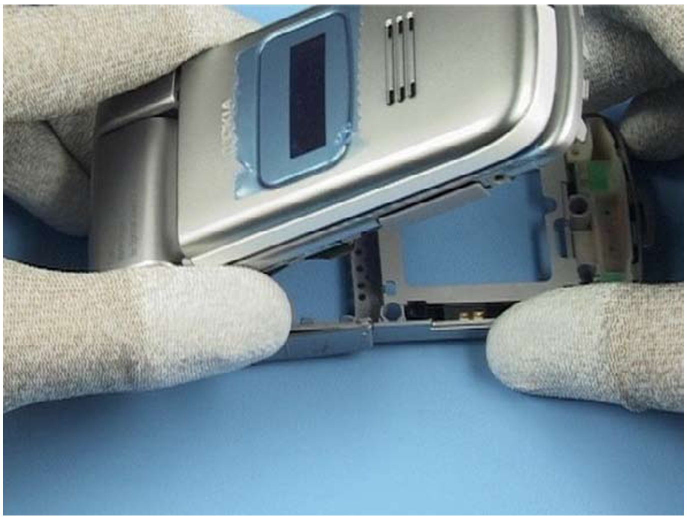
8. Remove the six torx plus size 6 screws in the order shown.



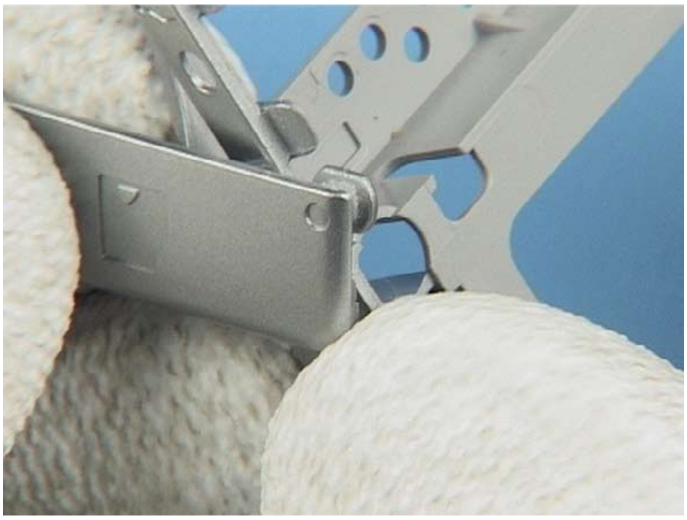
9. Carefully pry open the snaps of the Grip A-Cover with the SS- 93.



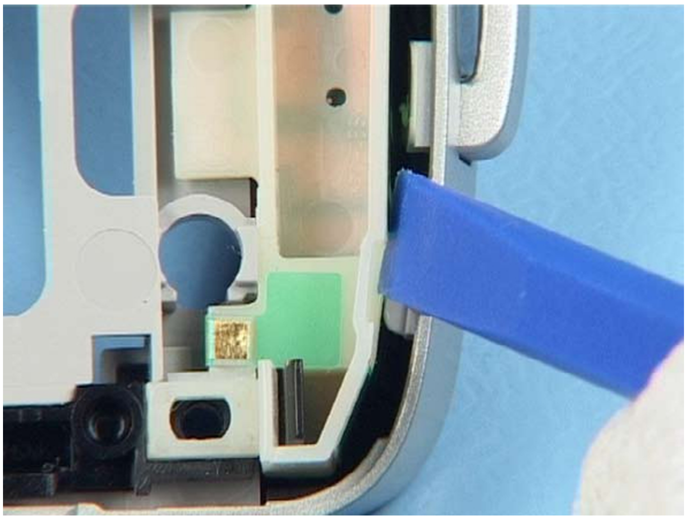
10. Separate the Grip B-Cover.



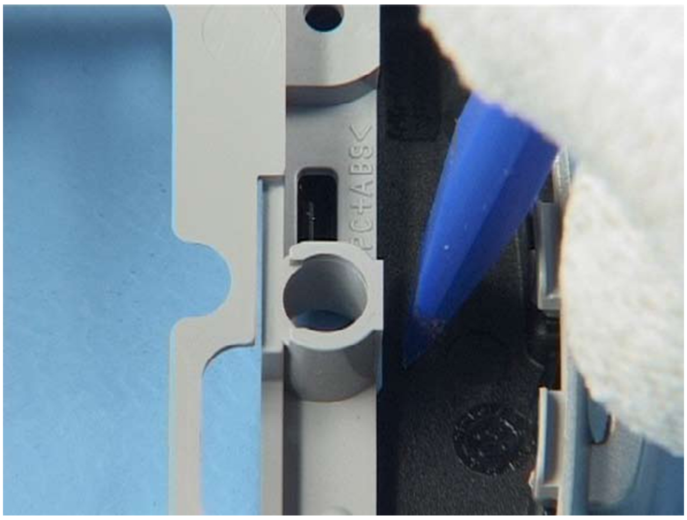
11. Push out the SD Bung Painted.



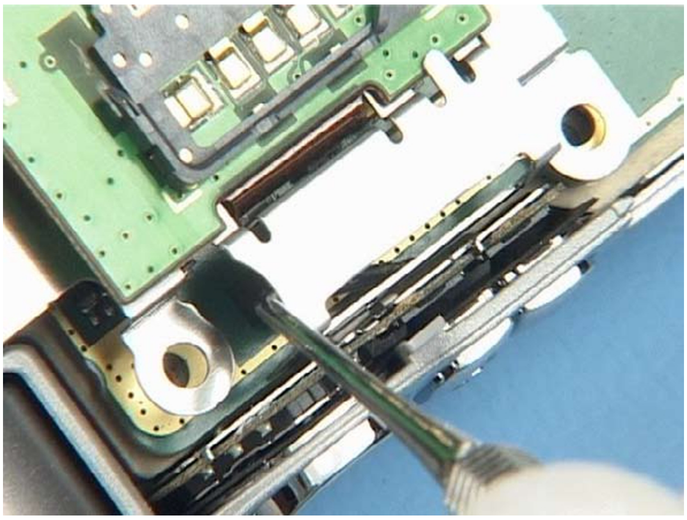
12. Ease out the Antenna Assy with the SS-93 carefully and remove it. The parts can be separate.



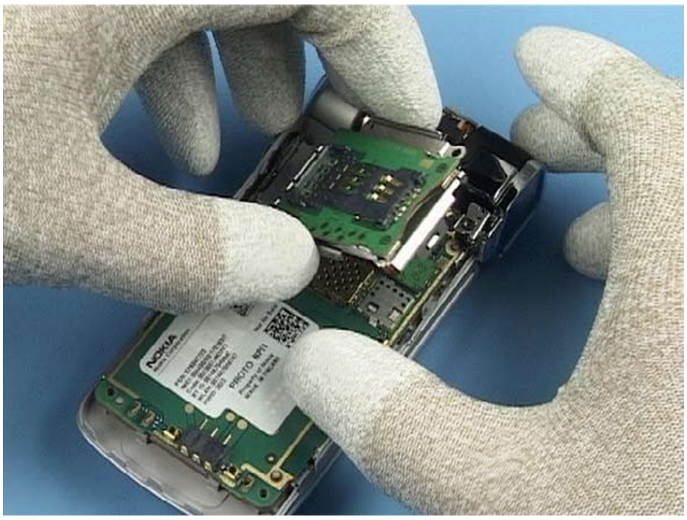
13. Hold down the Antenna Cover while lifting the Grip B-Cover.



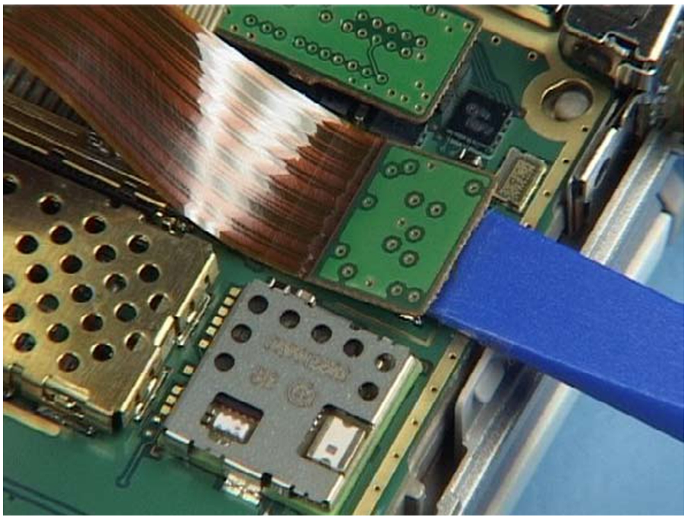
14. Carefully release the metal latches of the SDSIM Support Frame with the dental pic on both sides.



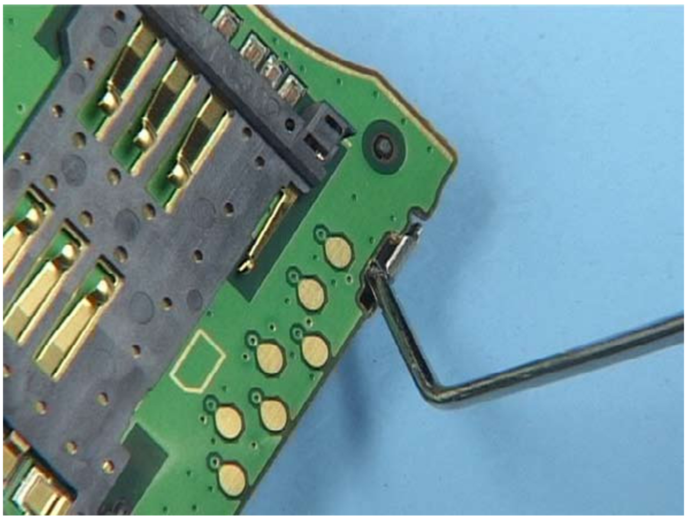
15. Lift up the SDSIM PWB Module.



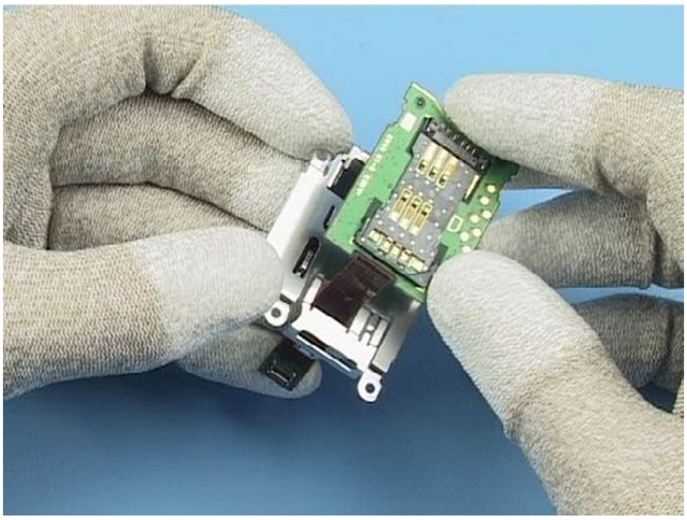
16. Disconnect the Flex foil connector.



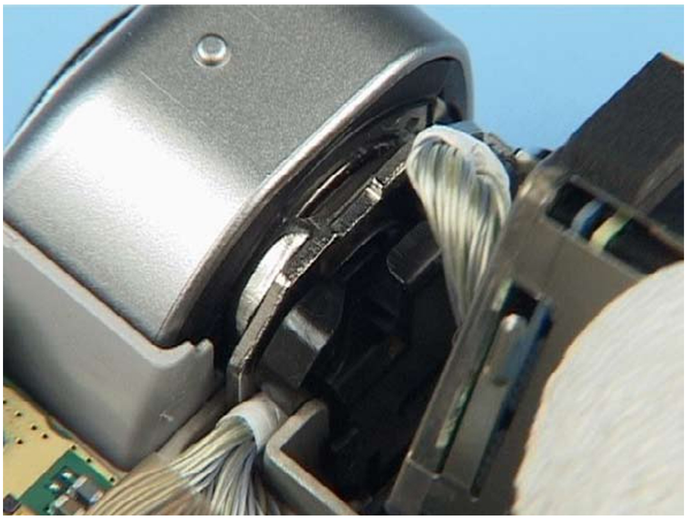
17. Bend out the metal latch as shown.



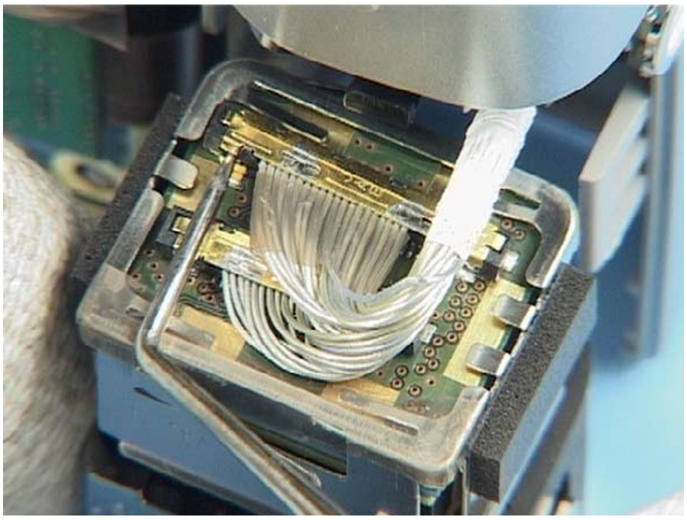
18. Separate the SDSIM PWB.



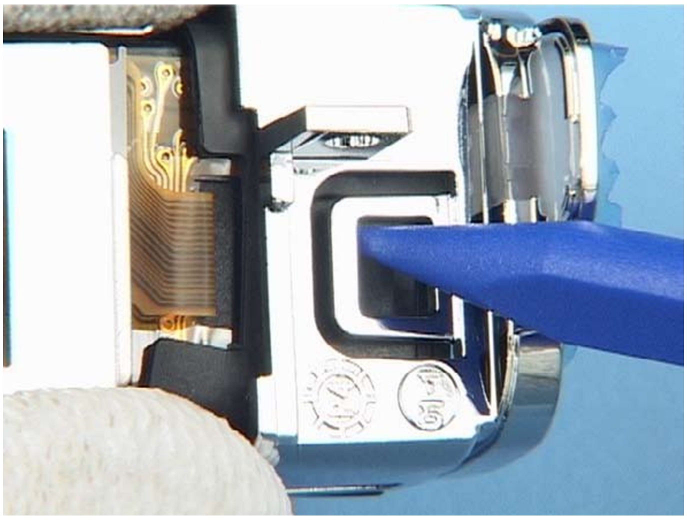
19. Carefully lift out the Camera unit, mind that the coax cables are still connected.



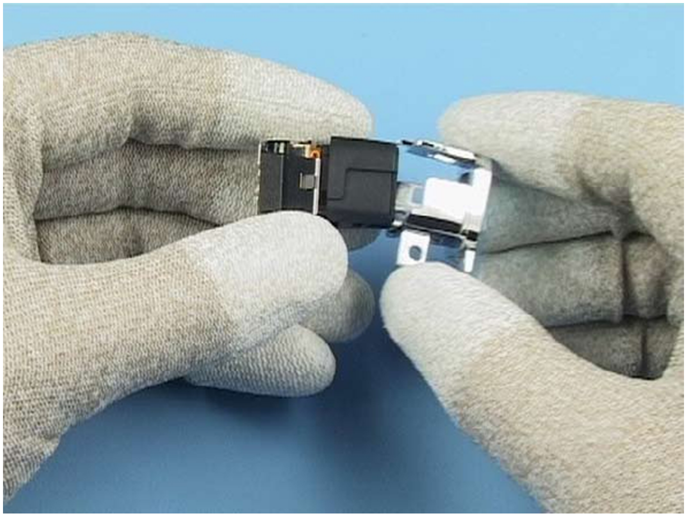
20. Carefully lever out the connectors as shown with the dental pic.



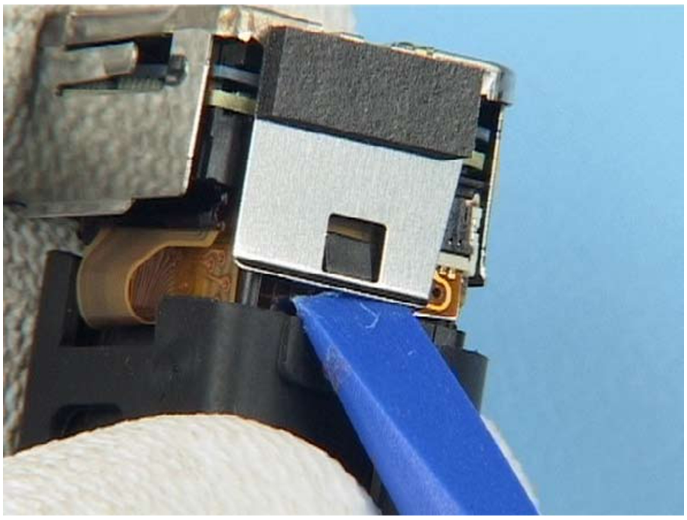
21. Unlock both latches of the Camera Bezel Assembly. These clips are very delicate and can be broken easily.



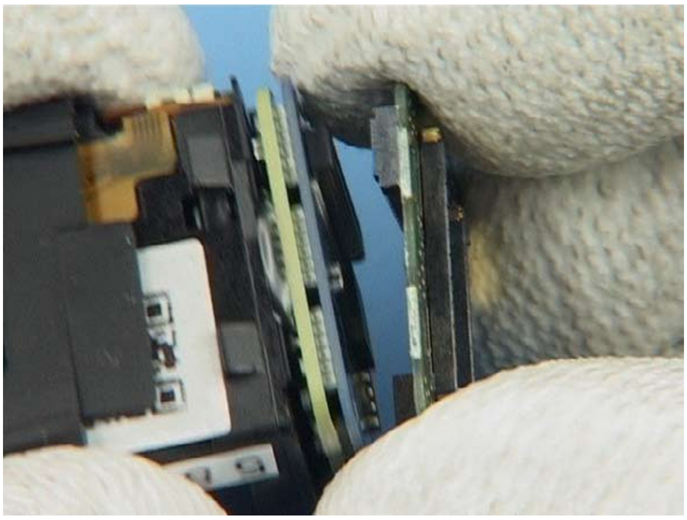
22. Remove the Camera Bezel Assembly.



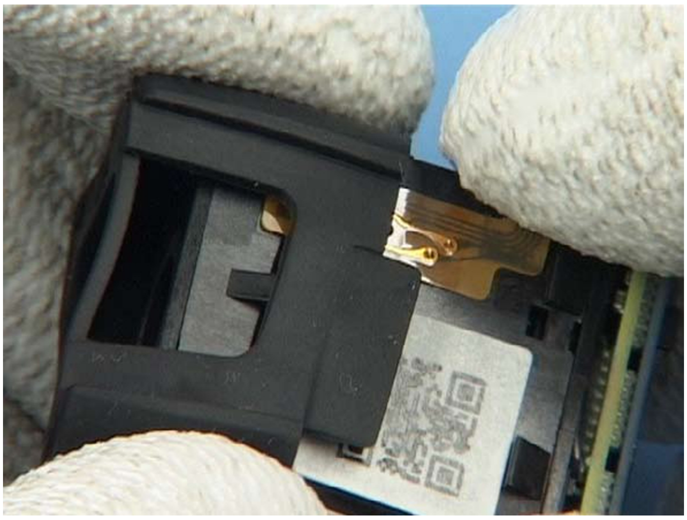
23. Unlock the metal latches of the Camera Shield Frame Assembly.



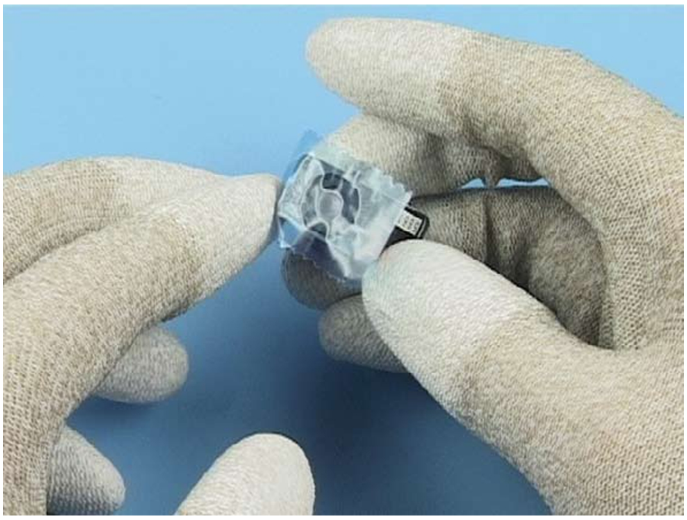
24. Remove the Camera IF PWB Module.



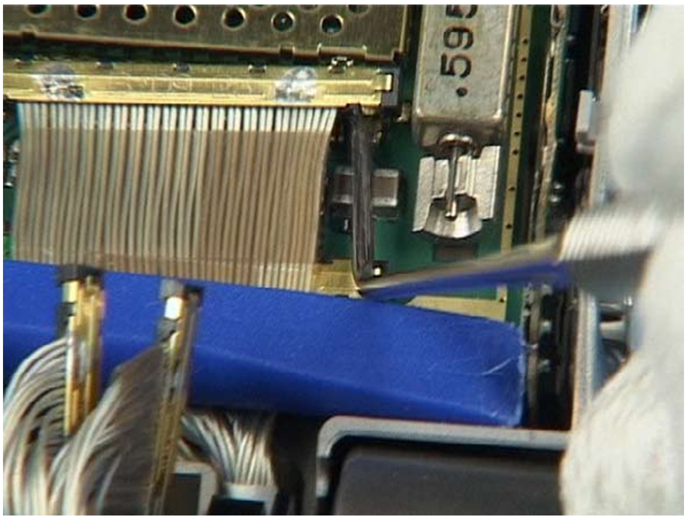
25. Peel up the Camera Cushion.



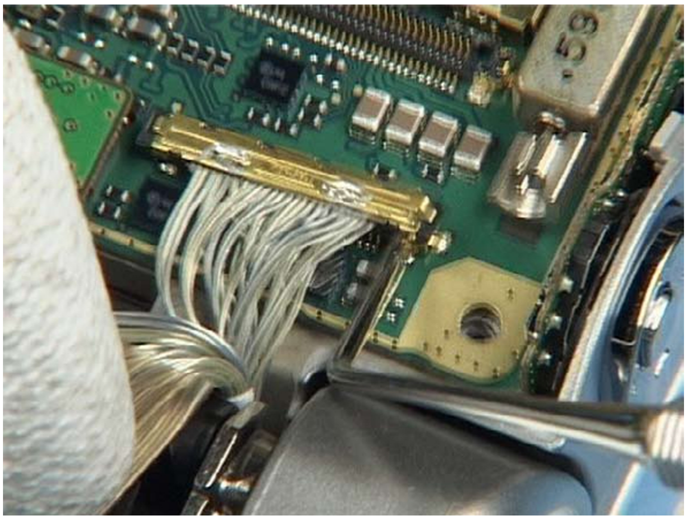
26. Cover the lens with a plastic film.



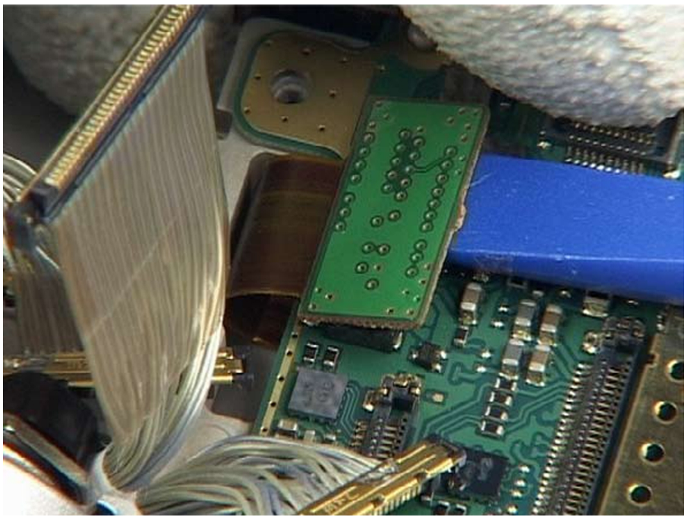
27. Gently pry open the connector evenly with the dental pic as shown.



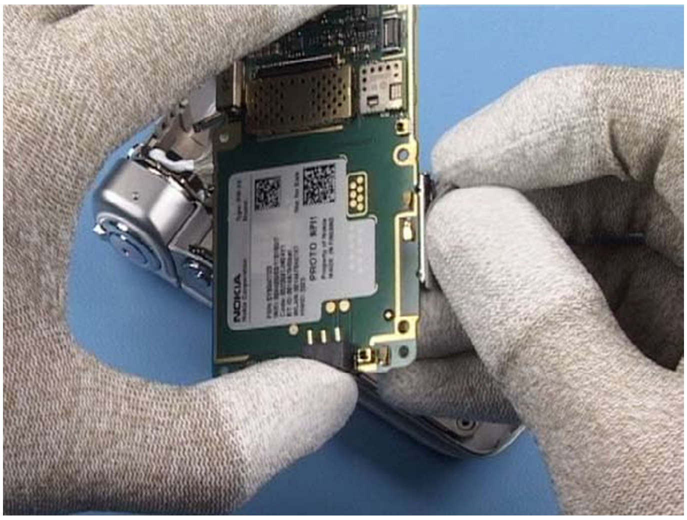
28. Also open the smaller connector.



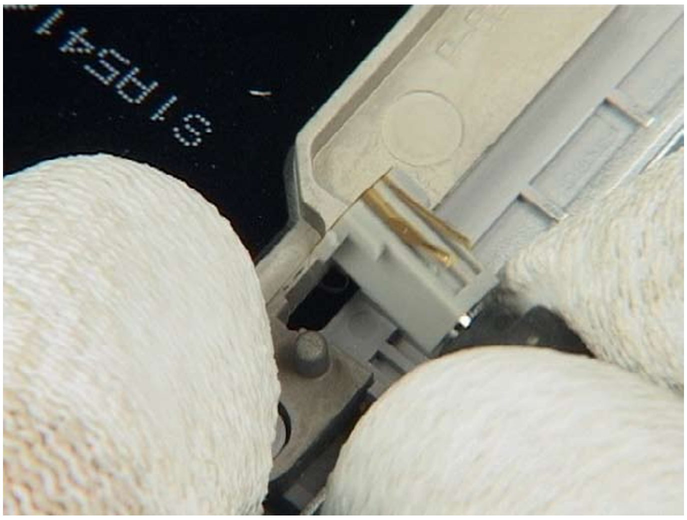
29. Disconnect the flex foil connector evenly.



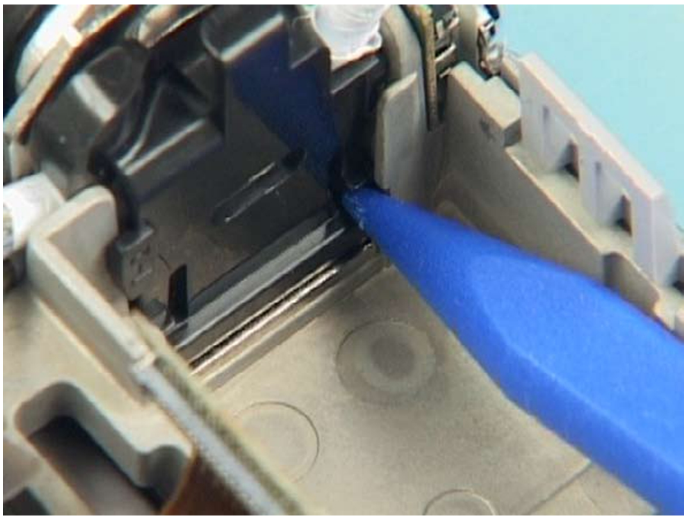
30. The POP Port Bung can now be removed.



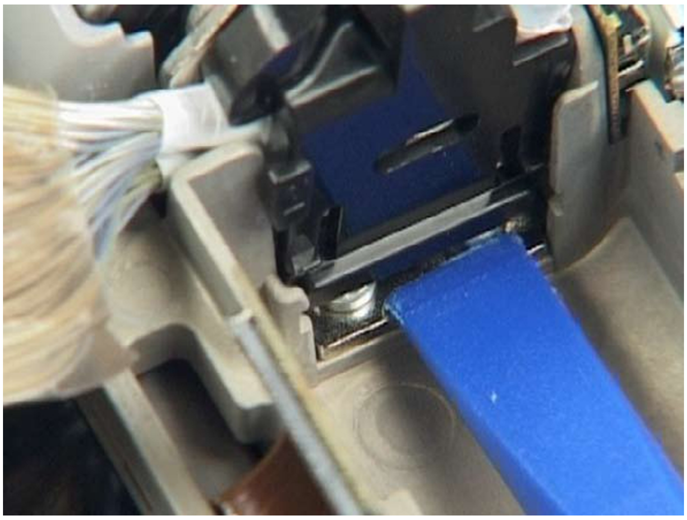
31. Use the DC Plug to remove the DC Jack.



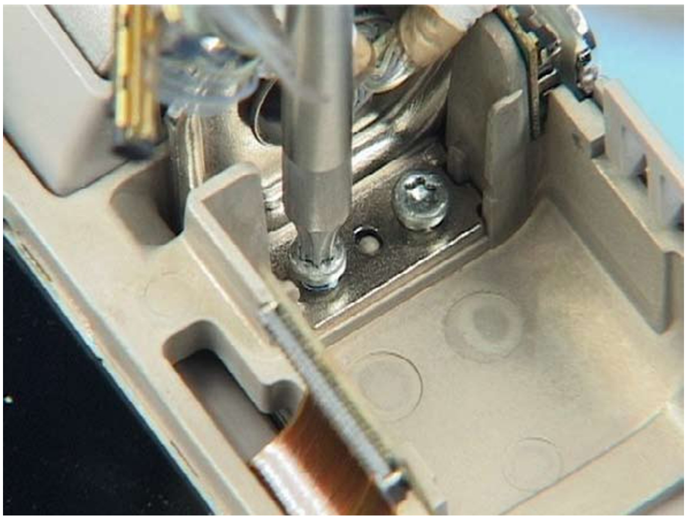
32. Gently unlock both snaps of the Harness Holder Grip.



33. Lever it out with the SS-93.

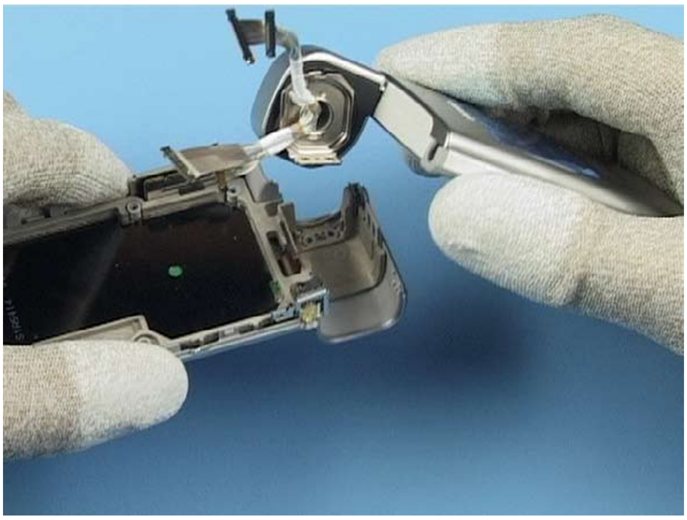


34. Undo both Torx size 6 screws and discard them.

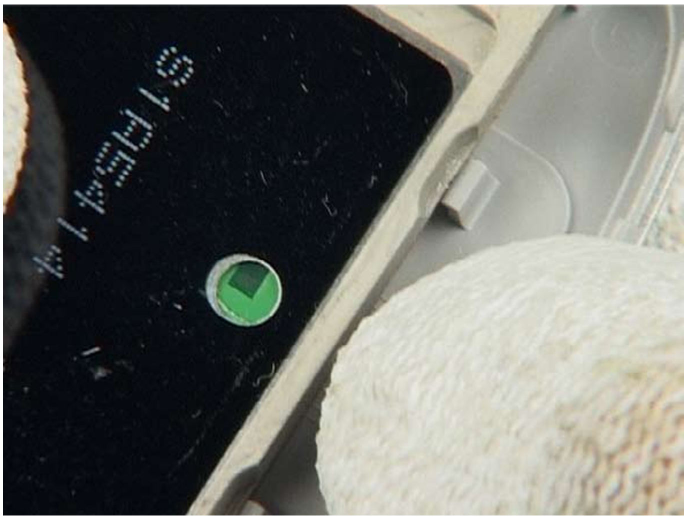


Note: Always use new screws when reassemble.

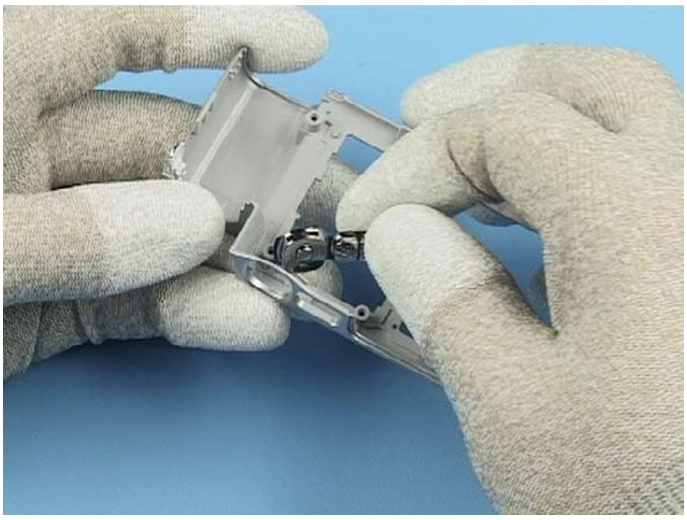
35. Bring the unit into position shown and separate the parts.



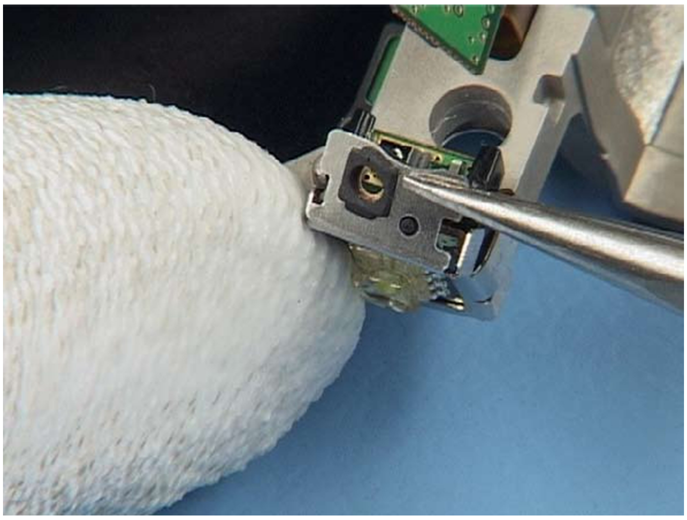
36. Unlock the snaps of the Grip A-Cover and separate the parts.



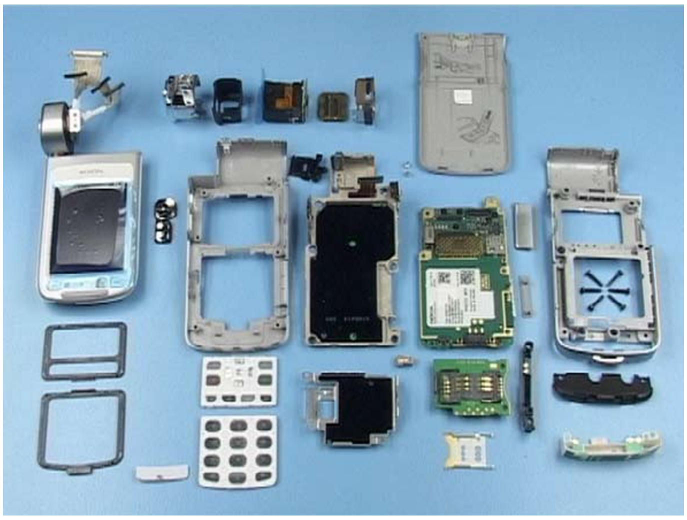
37. Remove the Side Keys.



38. Gently bend open the Mic Clip. Never touch the surface of the microphones.



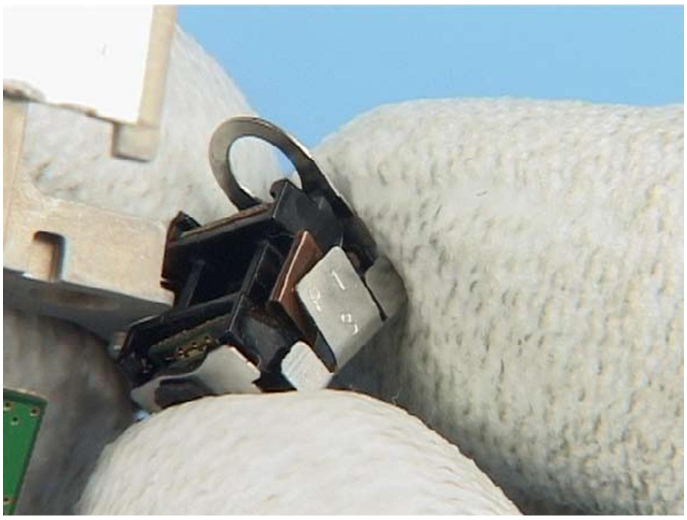
39. The disassembling procedure is now complete.



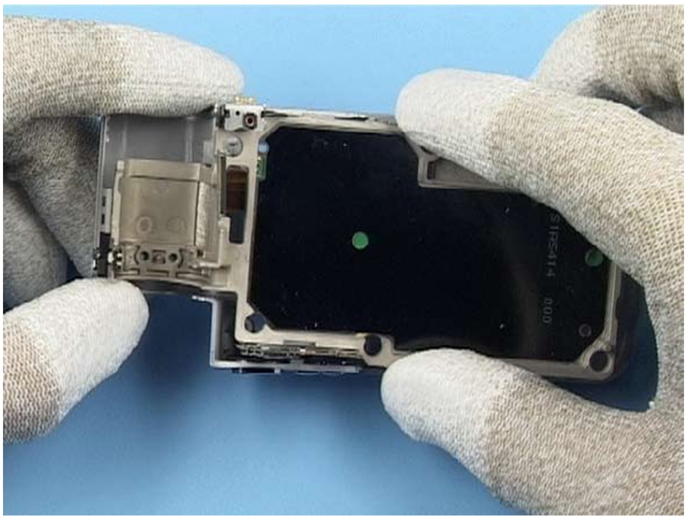
Lower block reassembly

Steps

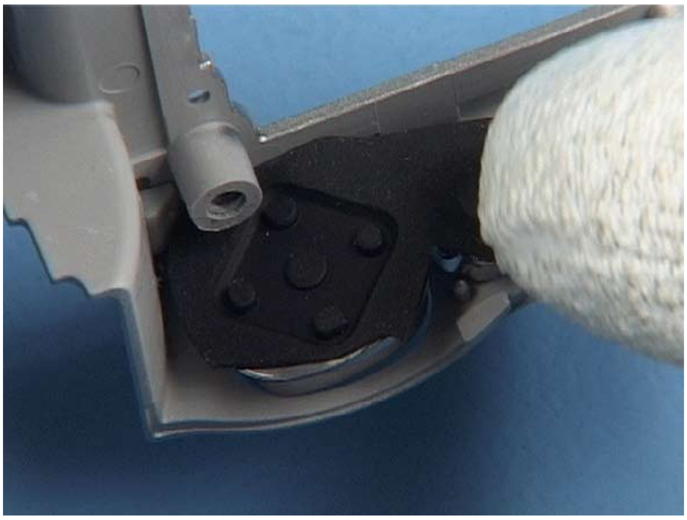
1. Place the Mic Clip, do not touch the microphones.



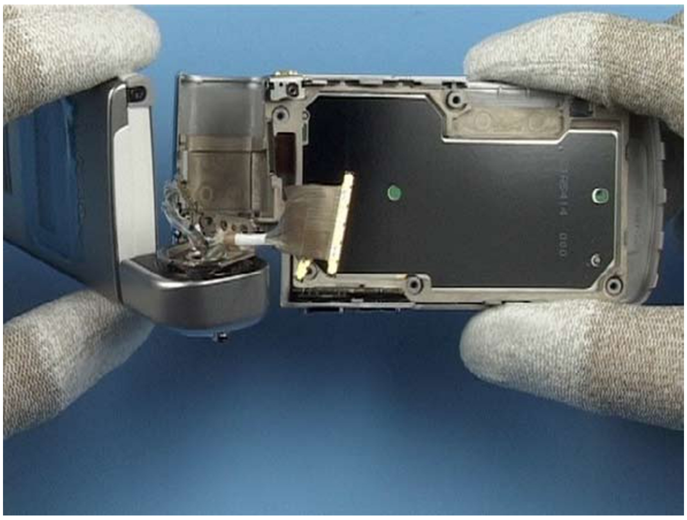
2. Insert the Side Keymat.



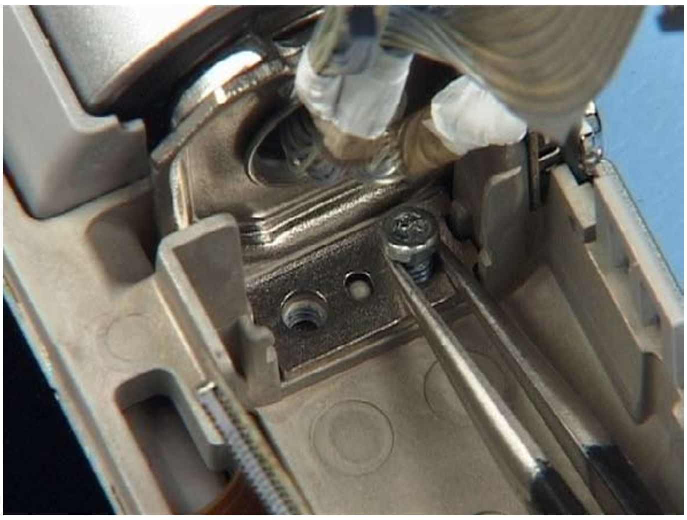
3. Place the UI Frame into the Grip A-Cover.



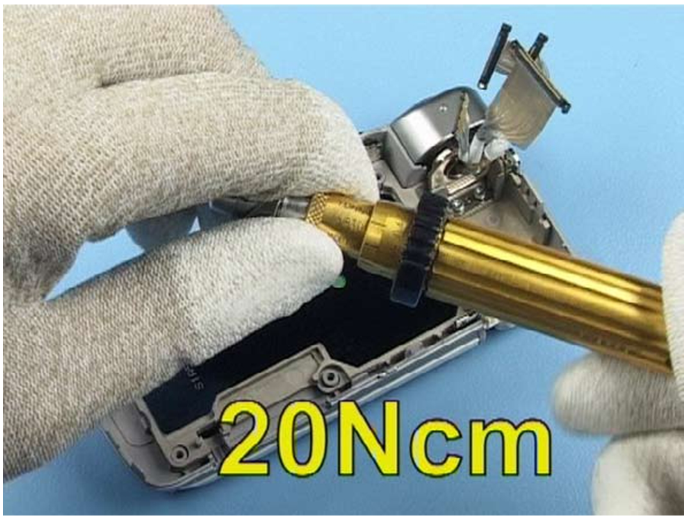
4. Bring the parts in position shown.



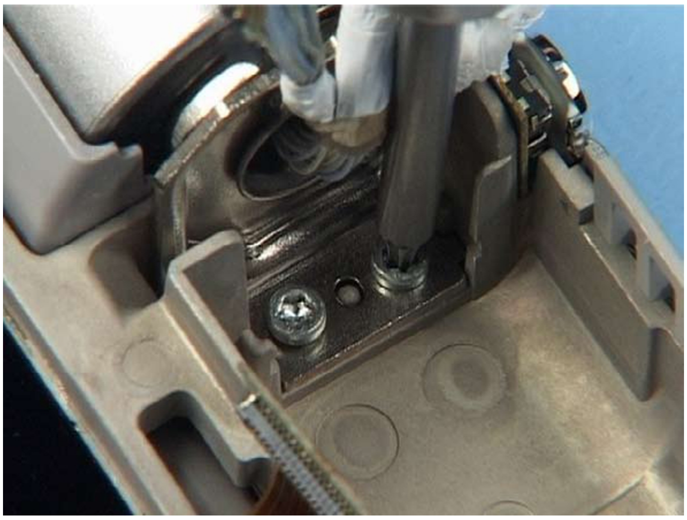
5. Insert the new torx size 6 screws.



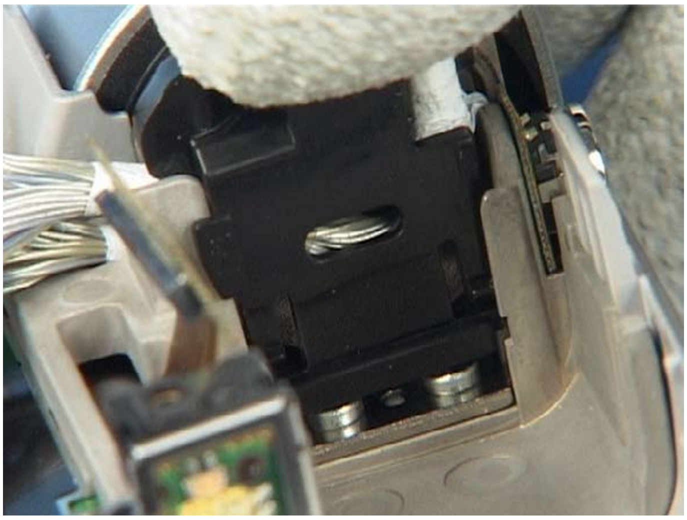
6. Set the correct torque.



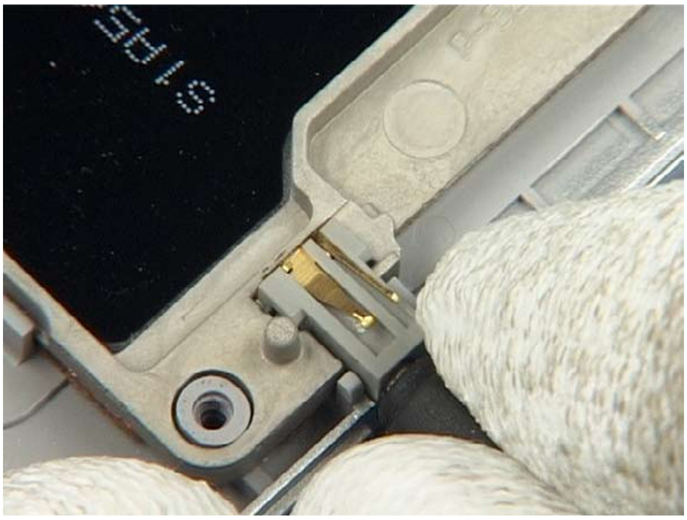
7. Apply the correct torque to both screws.



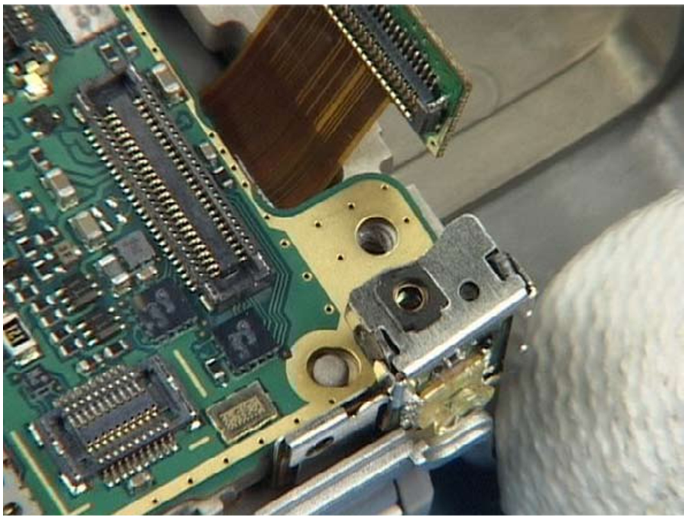
8. Insert the Harness Holder Grip.



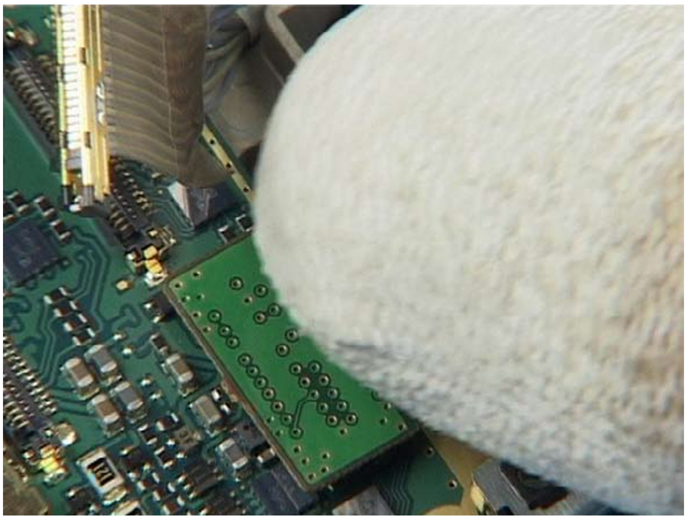
9. Place the DC Jack into its compartment.



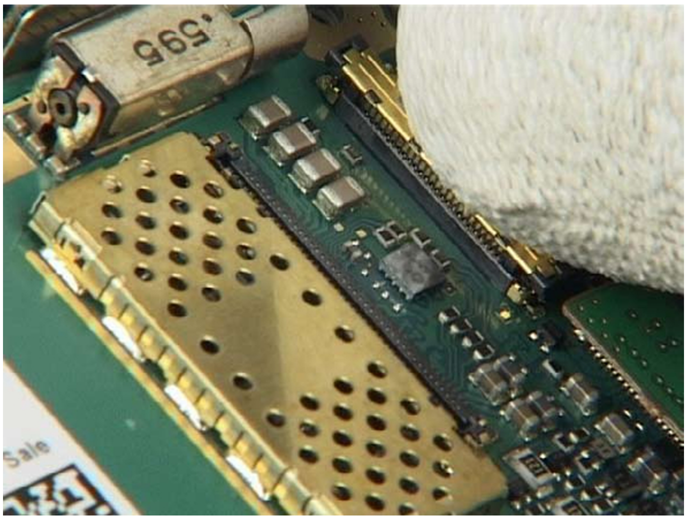
Note: Mind the guides while placing the Engine Module.



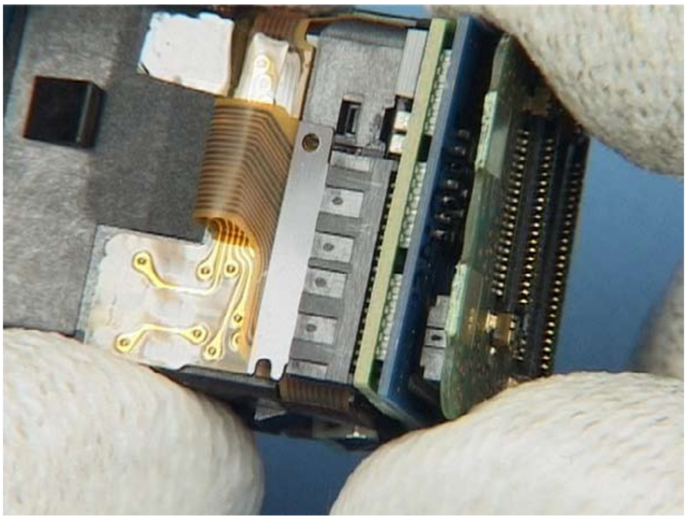
10. Close the flex connector.



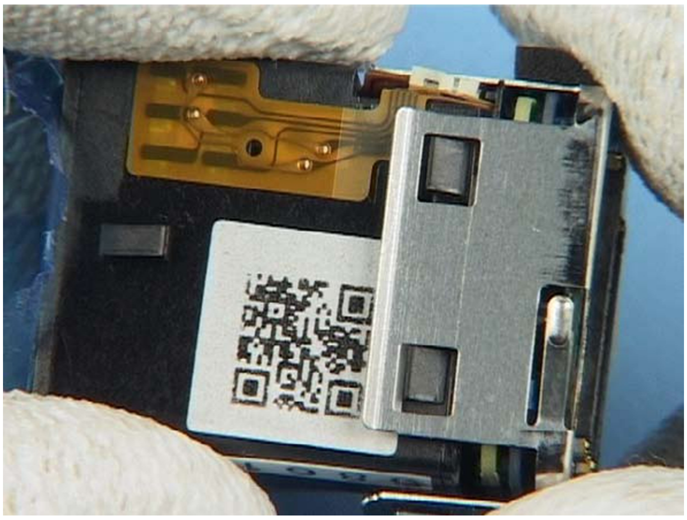
11. Carefully position and lock the connectors of the Hinge cables.



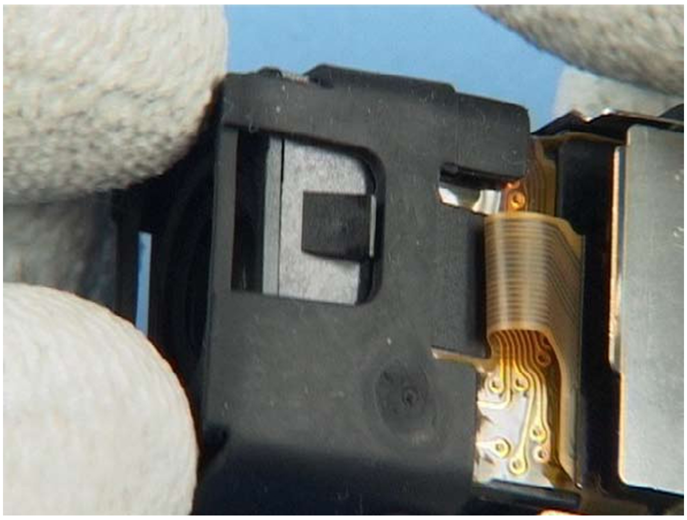
12. Connect the Camera IF Module.



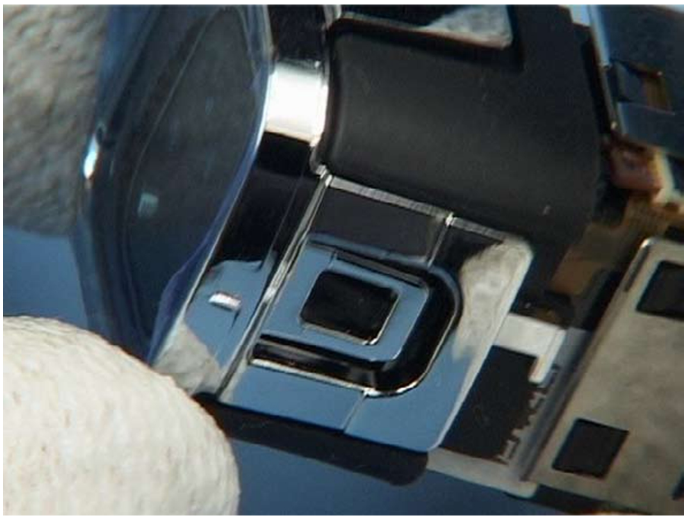
13. Place the Camera Shield Frame Assembly.



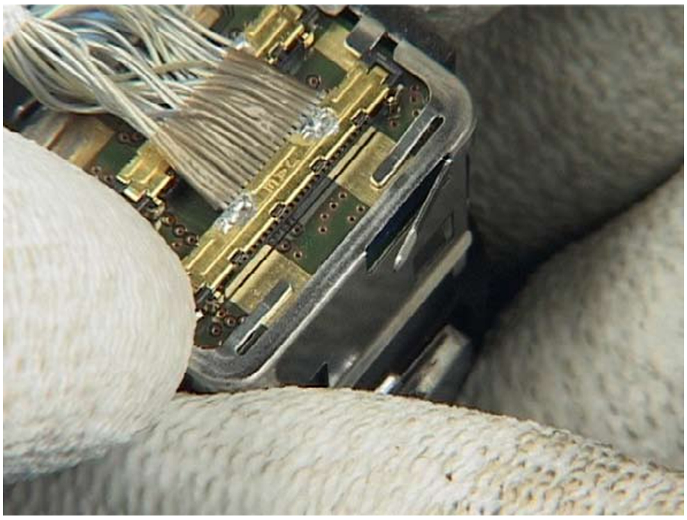
14. Shift the Camera Cushion into its correct position.



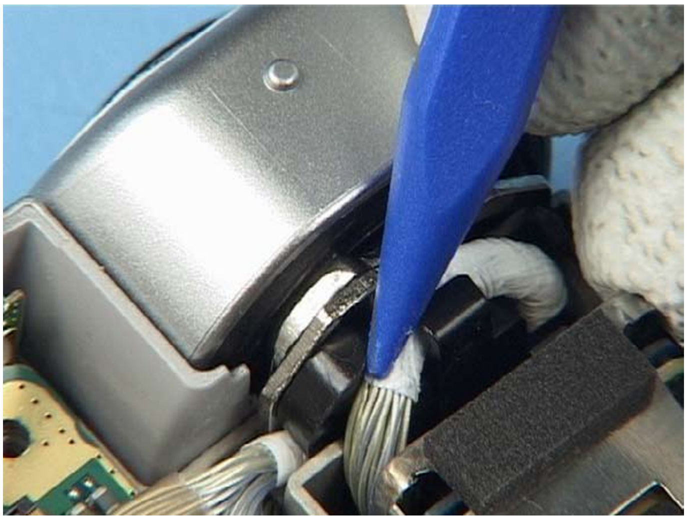
15. Insert the assembly into the Camera Bezel Assembly.



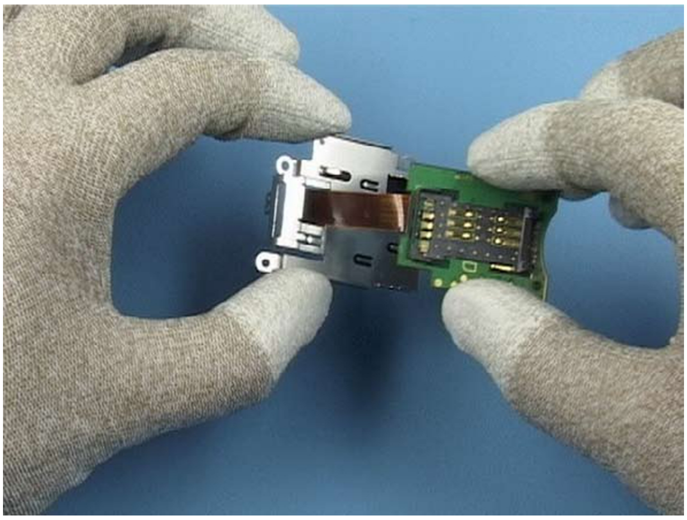
16. Now connect the Camera Module. Mind the correct positioning of the connectors.



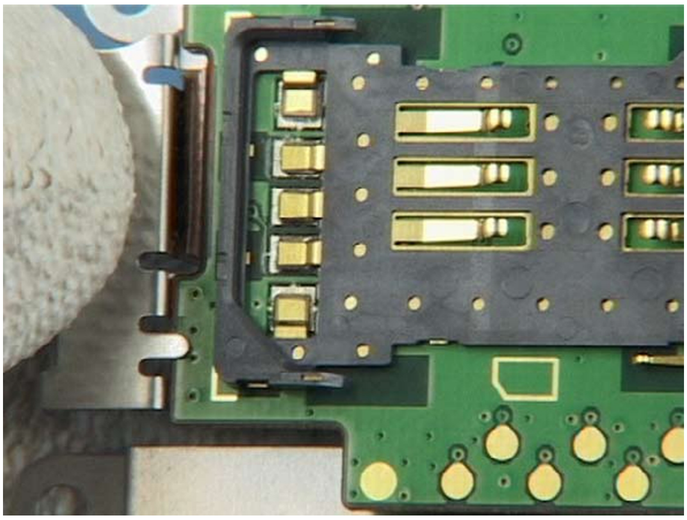
17. Ensure the correct positioning of the cables while placing the Camera Module into its housing.



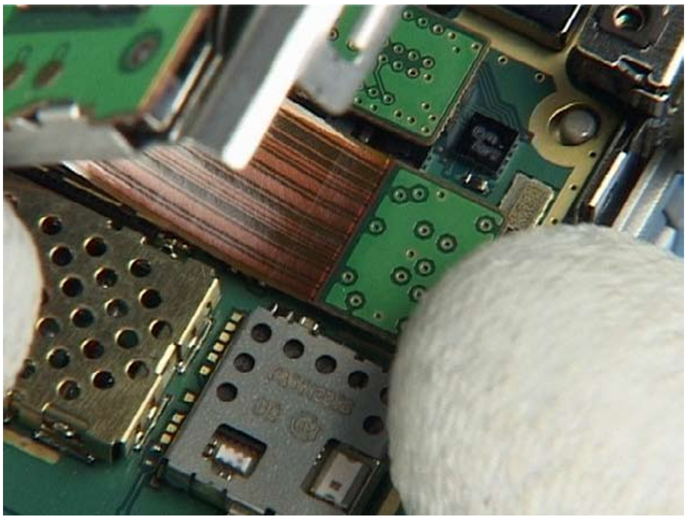
18. Slot the flex foil through the SDSIM Support Frame.



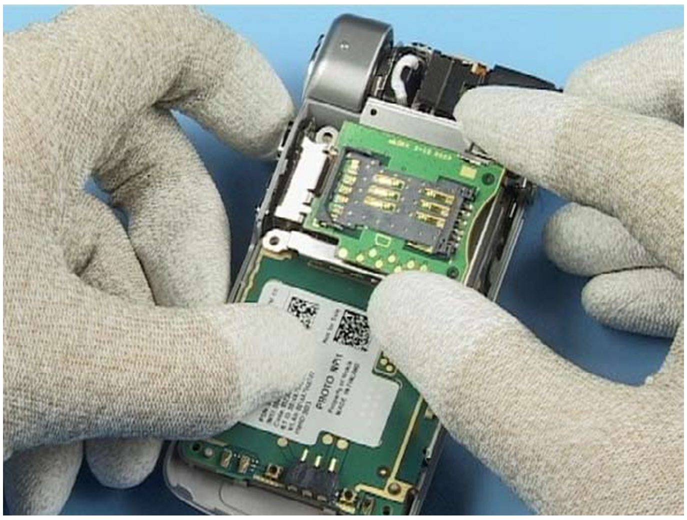
19. Position the SDSIM PWB as shown.



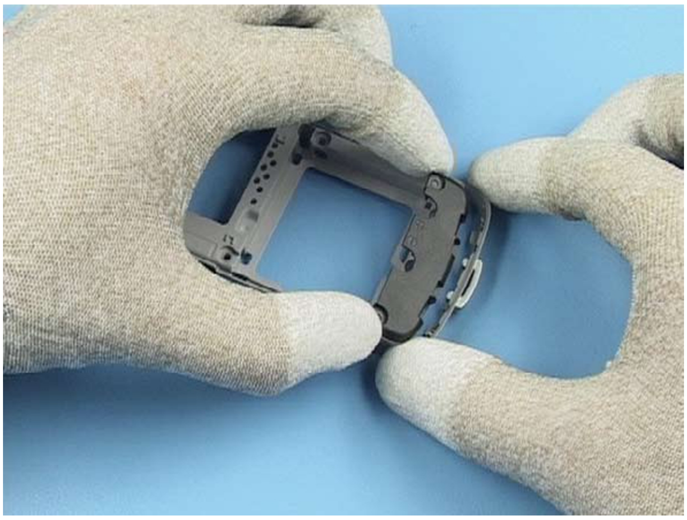
20. Close the flex foil connector.



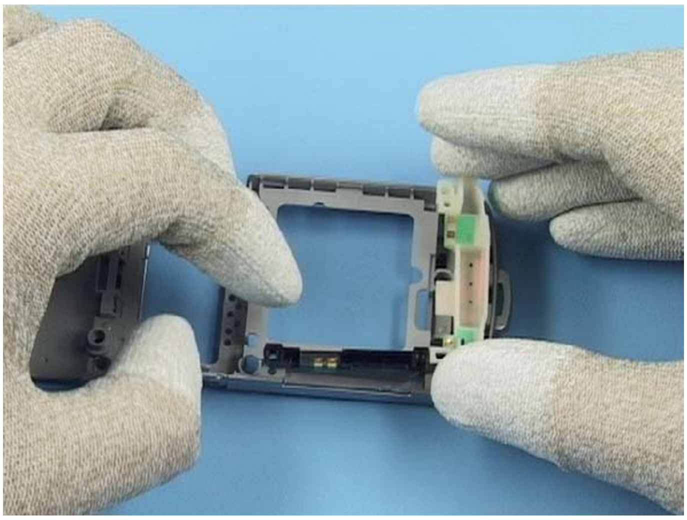
21. Place the SDSIM PWB Module and click the latches into their places.



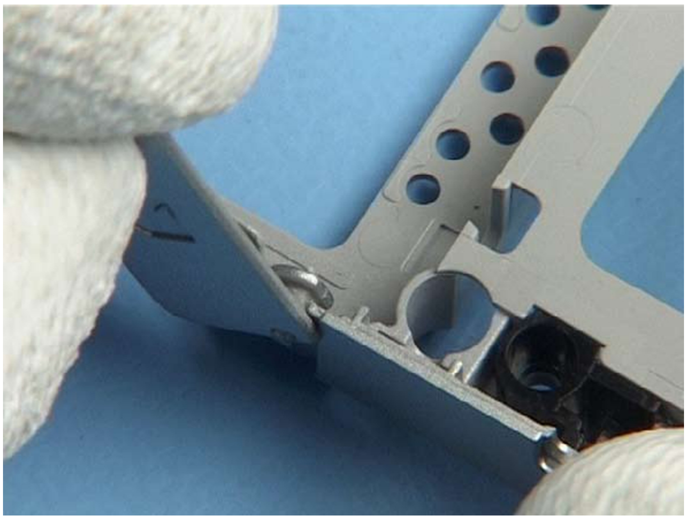
22. Click the Antenna Cover into its place.



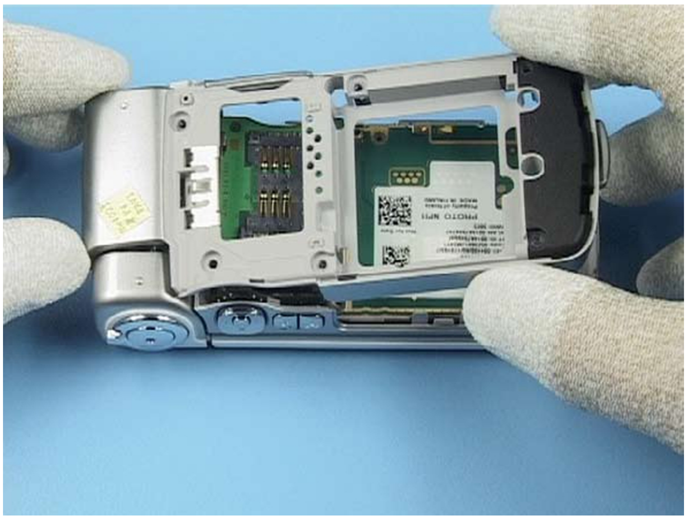
23. Insert the Antenna Assembly into the Grip B-Cover.



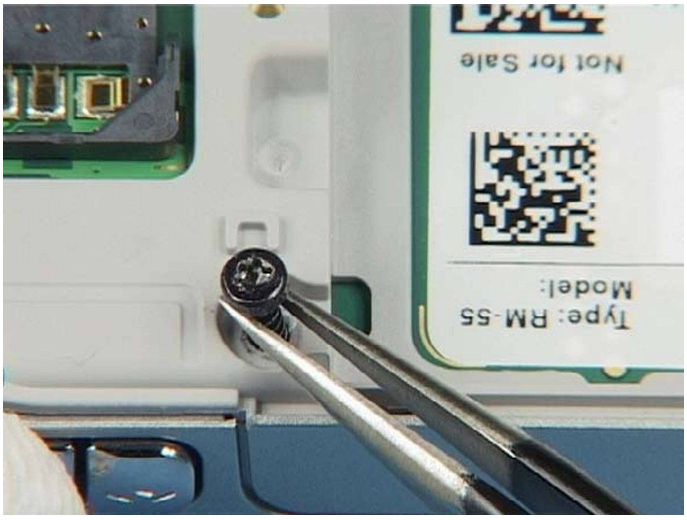
24. Place the SD Bung Painted.



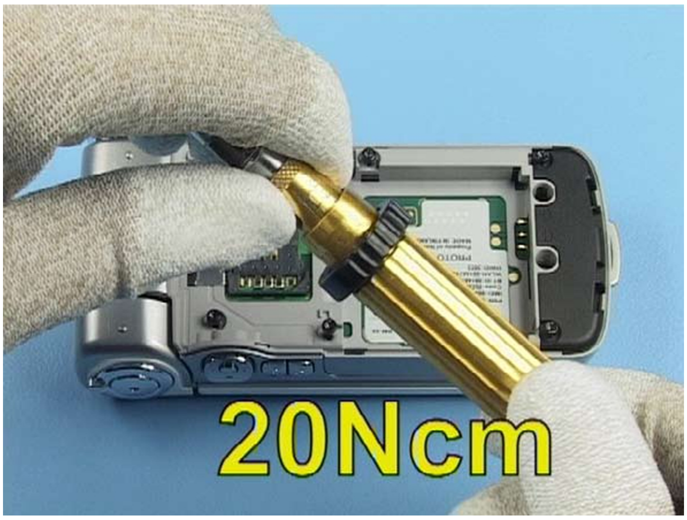
25. Position the Grip B-Cover over the Assembly.



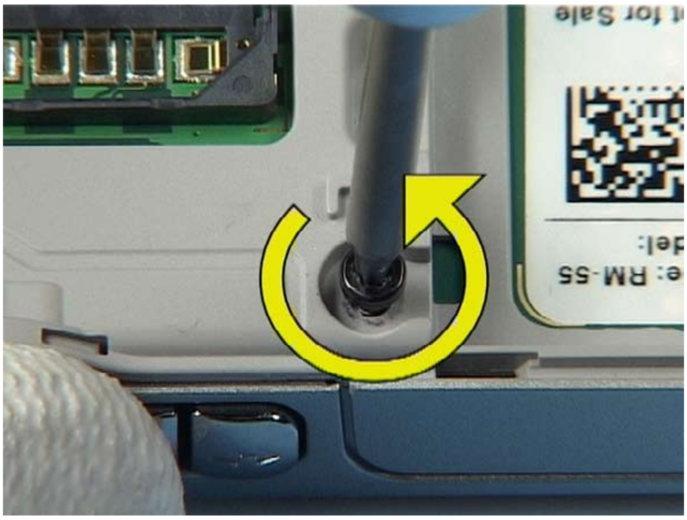
26. Insert the screws.



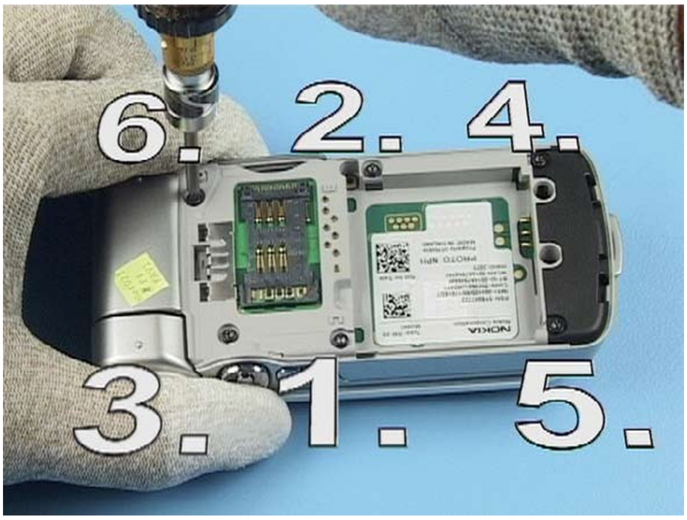
27. Set the correct torque.



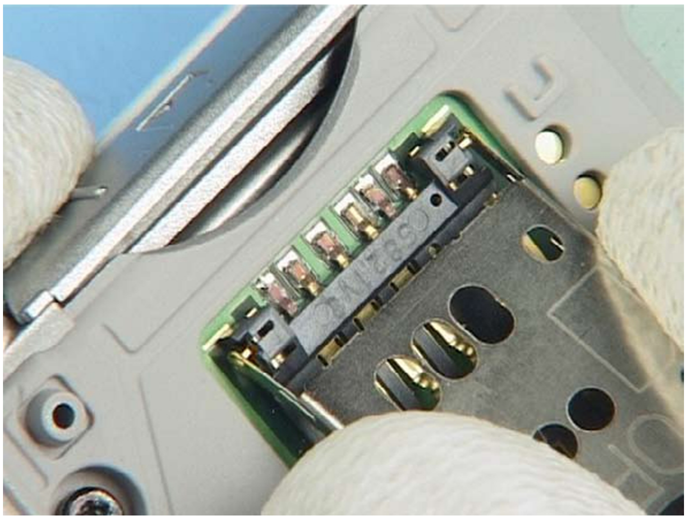
28. To prevent destroying the plastic threads, first turn the screws left.



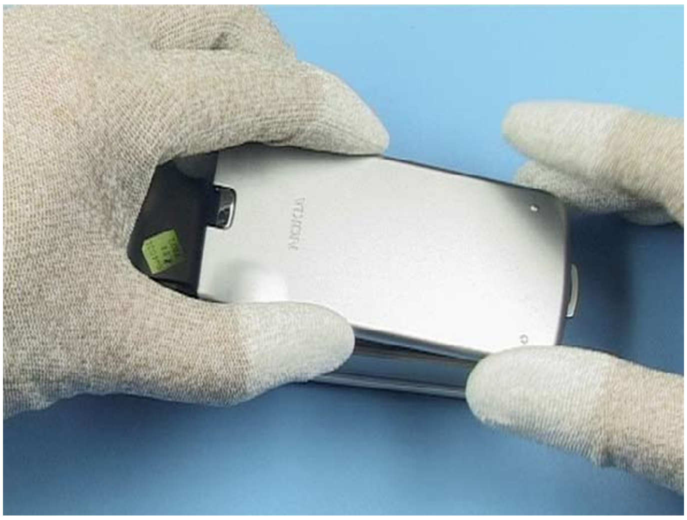
29. Then tighten them in the correct order shown.



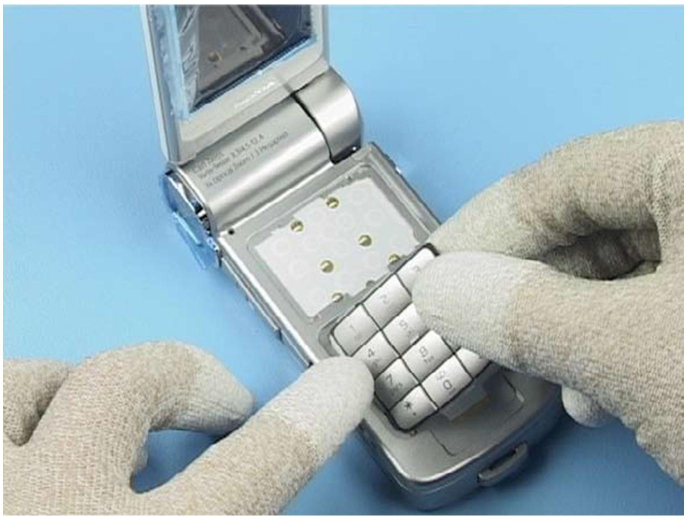
30. Position the SIM Flap.



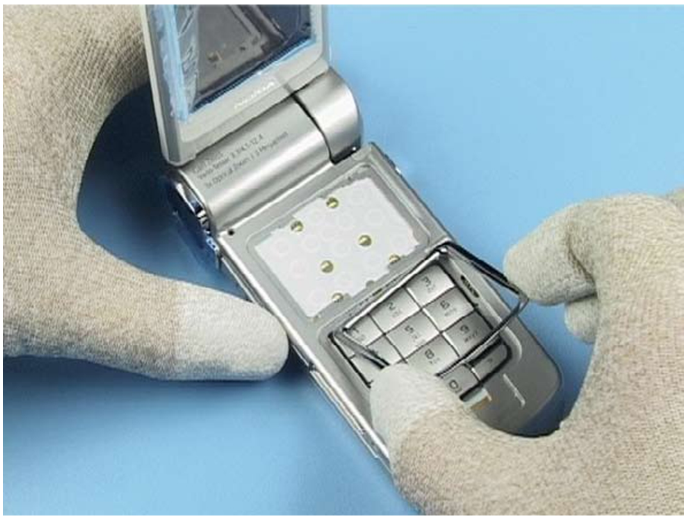
31. Place the Grip C-Cover Assembly, beginning from the bottom.



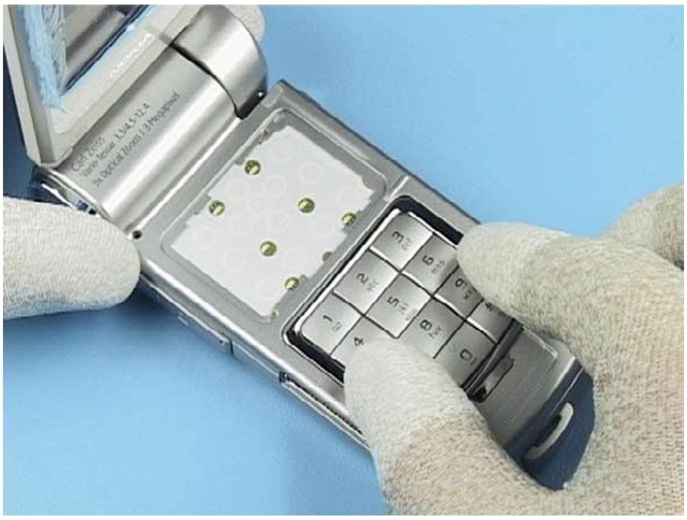
32. Insert the Keymat ITU.



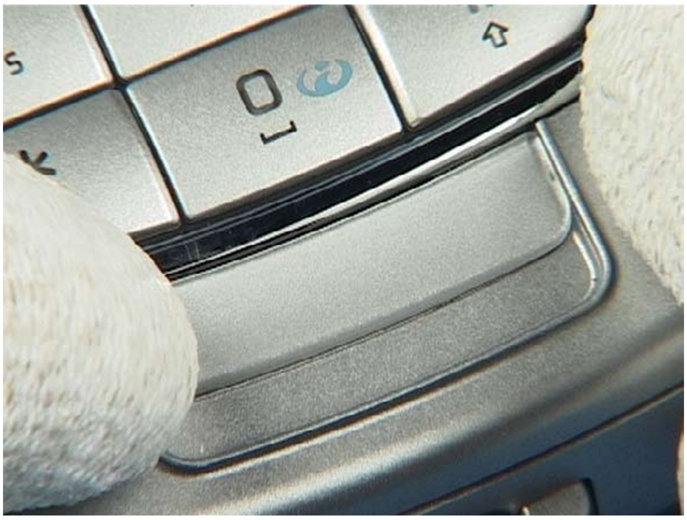
33. Use a new Bezel ITU to fix the keymat.



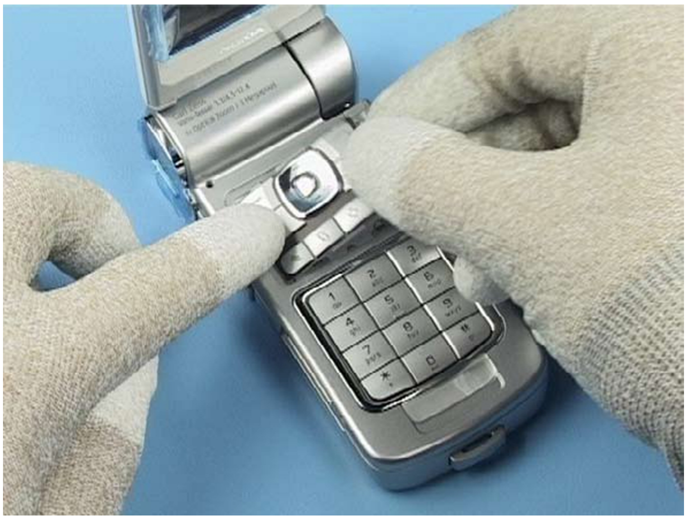
34. Smooth it down evenly.



35. Place a new Logo Label.

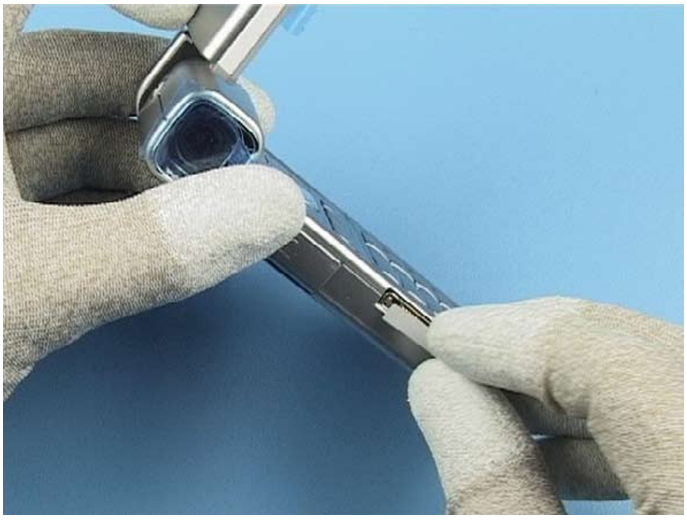


36. Position the Keymat S60.



37. And fix it with a new Bezel S60.

38. Complete the Assembly with the POP Port Bung Painted.



39. At least check the windows for cleanness.

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6 — BB Troubleshooting and Tuning Guide

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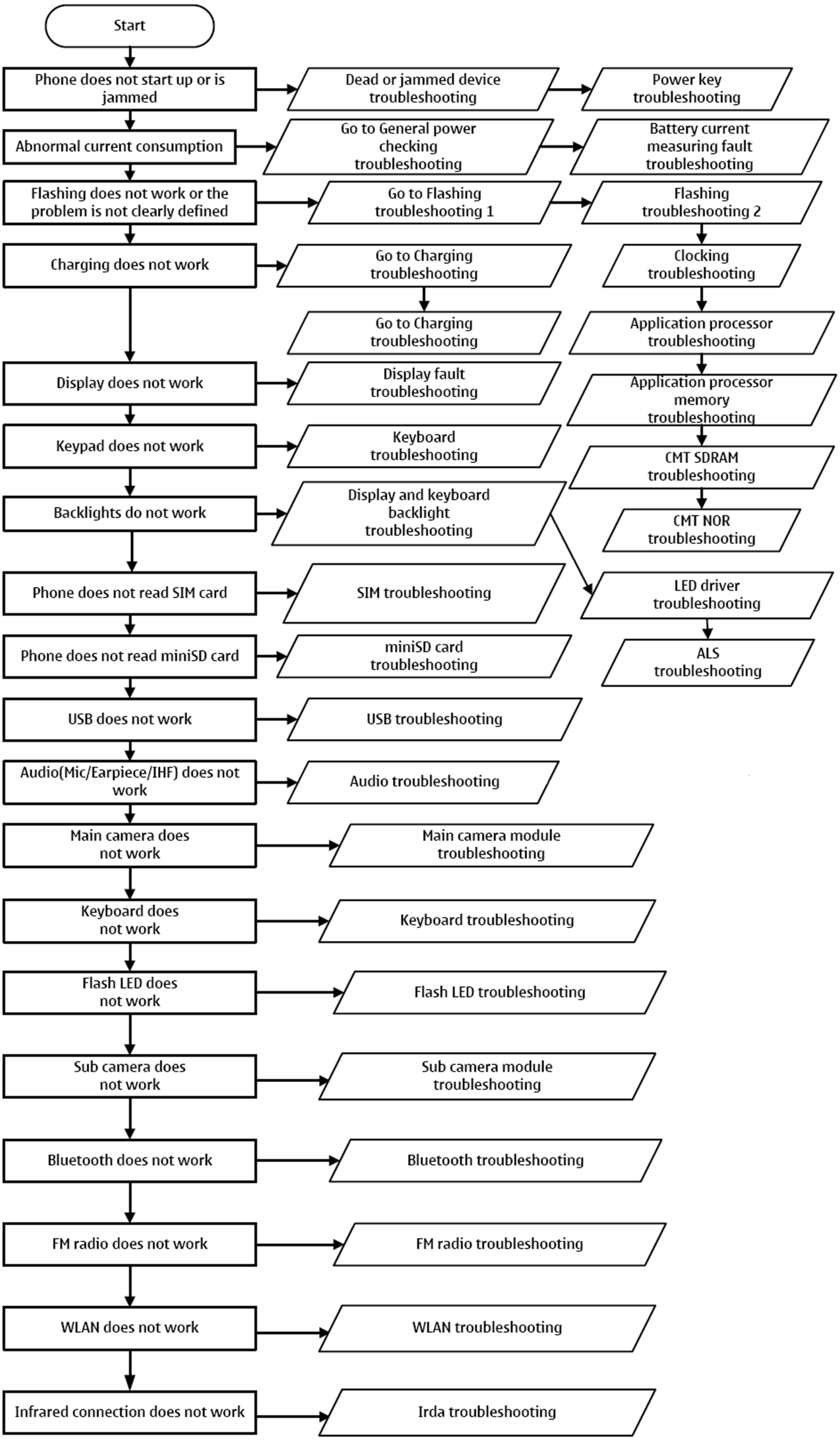
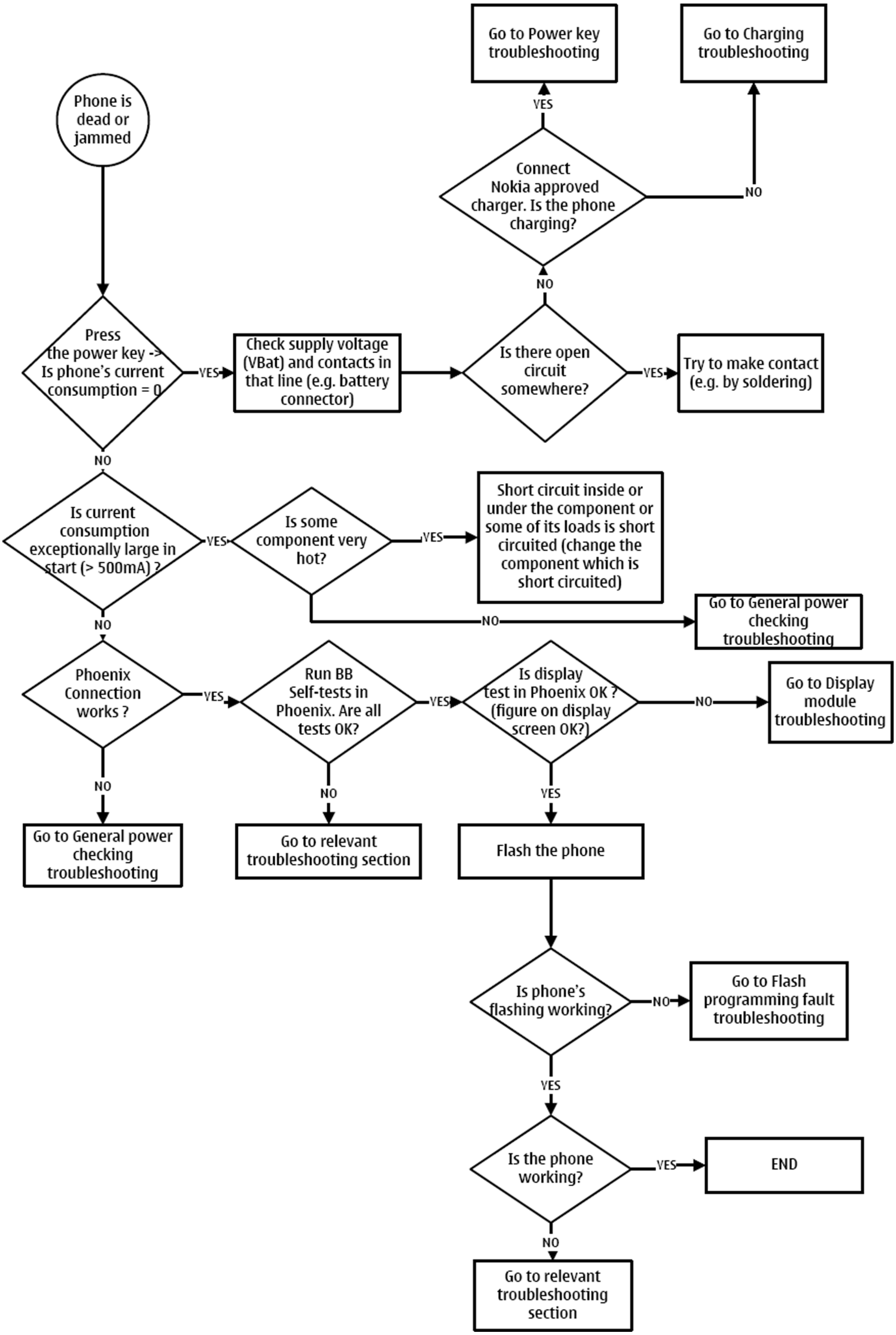
Baseband troubleshooting

Troubleshooting flow


Start
Phone does not start up or is jammed
Dead or jammed device troubleshooting
Power key troubleshooting
Abnormal current consumption
Go to General power checking troubleshooting
Battery current measuring fault troubleshooting
Flashing does not work or the problem is not clearly defined
Go to Flashing troubleshooting 1
Flashing troubleshooting 2
Charging does not work
Go to Charging troubleshooting
Clocking troubleshooting
Go to Charging troubleshooting
Application processor troubleshooting
Display does not work
Display fault troubleshooting
Application processor memory troubleshooting
Keypad does not work
Keyboard troubleshooting
CMT SDRAM troubleshooting
Backlights do not work
Display and keyboard backlight troubleshooting
CMT NOR troubleshooting
Phone does not read SIM card
SIM troubleshooting
LED driver troubleshooting
Phone does not read miniSD card
miniSD card troubleshooting
ALS troubleshooting
USB does not work
USB troubleshooting
Audio(Mic/Earpiece/IHF) does not work
Audio troubleshooting
Main camera does not work
Main camera module troubleshooting
Keyboard does not work
Keyboard troubleshooting
Flash LED does not work
Flash LED troubleshooting
Sub camera does not work
Sub camera module troubleshooting
Bluetooth does not work
Bluetooth troubleshooting
FM radio does not work
FM radio troubleshooting
WLAN does not work
WLAN troubleshooting
Infrared connection does not work
Irda troubleshooting

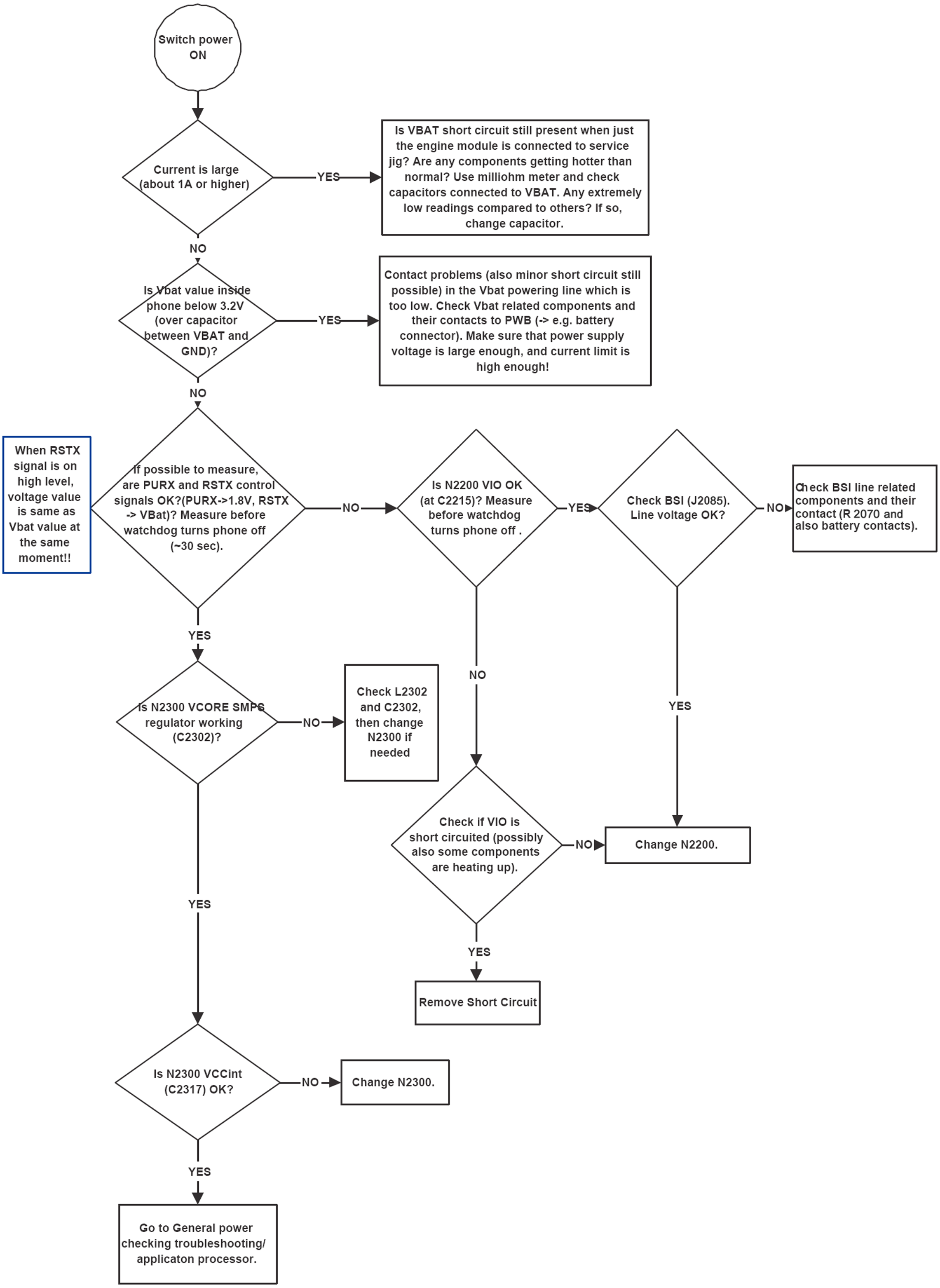
Dead or jammed device troubleshooting

Troubleshooting flow


Phone is dead or jammed
Press the power key -> Is phone's current consumption = 0
YES
Check supply voltage (VBat) and contacts in that line (e.g. battery connector)
Is there open circuit somewhere?
YES
Try to make contact (e.g. by soldering)
NO
Connect Nokia approved charger. Is the phone charging?
YES
Go to Power key troubleshooting
NO
Go to Charging troubleshooting
NO
Is current consumption exceptionally large in start (> 500mA) ?
YES
Is some component very hot?
YES
Short circuit inside or under the component or some of its loads is short circuited (change the component which is short circuited)
NO
Go to General power checking troubleshooting
NO
Phoenix Connection works ?
NO
Go to General power checking troubleshooting
YES
Run BB Self-tests in Phoenix. Are all tests OK?
NO
Go to relevant troubleshooting section
YES
Is display test in Phoenix OK ? (figure on display screen OK?)
NO
Go to Display module troubleshooting
YES
Flash the phone
Is phone's flashing working?
NO
Go to Flash programming fault troubleshooting
YES
Is the phone working?
YES
END
NO
Go to relevant troubleshooting section

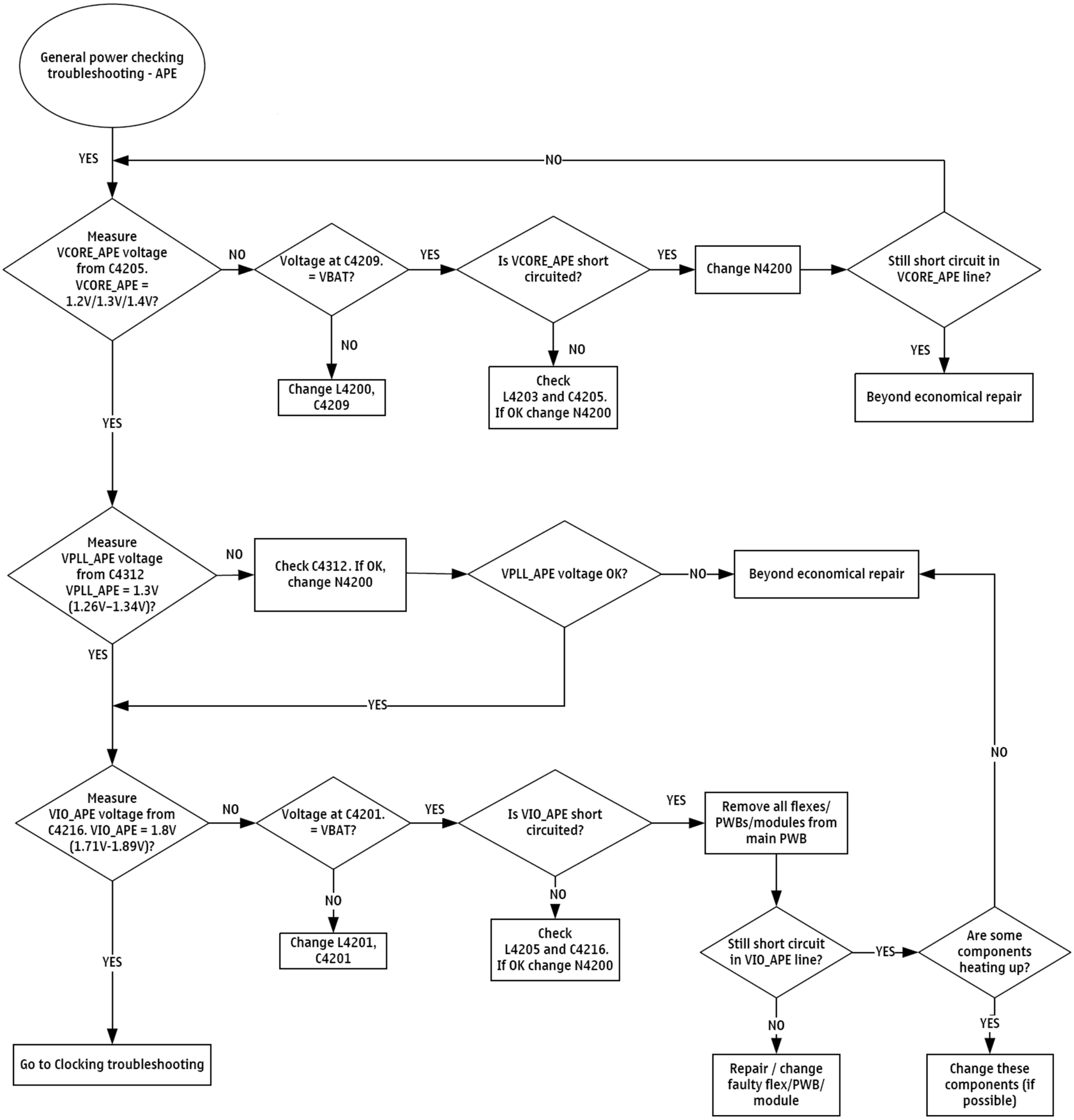
General power checking troubleshooting - CMT

Troubleshooting flow


Switch power ON
Current is large (about 1A or higher)
YES
Is VBAT short circuit still present when just the engine module is connected to service jig? Are any components getting hotter than normal? Use milliohm meter and check capacitors connected to VBAT. Any extremely low readings compared to others? If so, change capacitor.
NO
Is Vbat value inside phone below 3.2V (over capacitor between VBAT and GND)?
YES
Contact problems (also minor short circuit still possible) in the Vbat powering line which is too low. Check Vbat related components and their contacts to PWB (-> e.g. battery connector). Make sure that power supply voltage is large enough, and current limit is high enough!
NO
When RSTX signal is on high level, voltage value is same as Vbat value at the same moment!!
If possible to measure, are PURX and RSTX control signals OK?(PURX->1.8V, RSTX -> VBat)? Measure before watchdog turns phone off (~30 sec).
NO
Is N2200 VIO OK (at C2215)? Measure before watchdog turns phone off .
YES
Check BSI (J2085). Line voltage OK?
NO
Check BSI line related components and their contact (R 2070 and also battery contacts).
YES
NO
YES
Is N2300 VCORE SMPS regulator working (C2302)?
NO
Check L2302 and C2302, then change N2300 if needed
Check if VIO is short circuited (possibly also some components are heating up).
NO
Change N2200.
YES
Remove Short Circuit
YES
Is N2300 VCCint (C2317) OK?
NO
Change N2300.
YES
Go to General power checking troubleshooting/ applicaton processor.

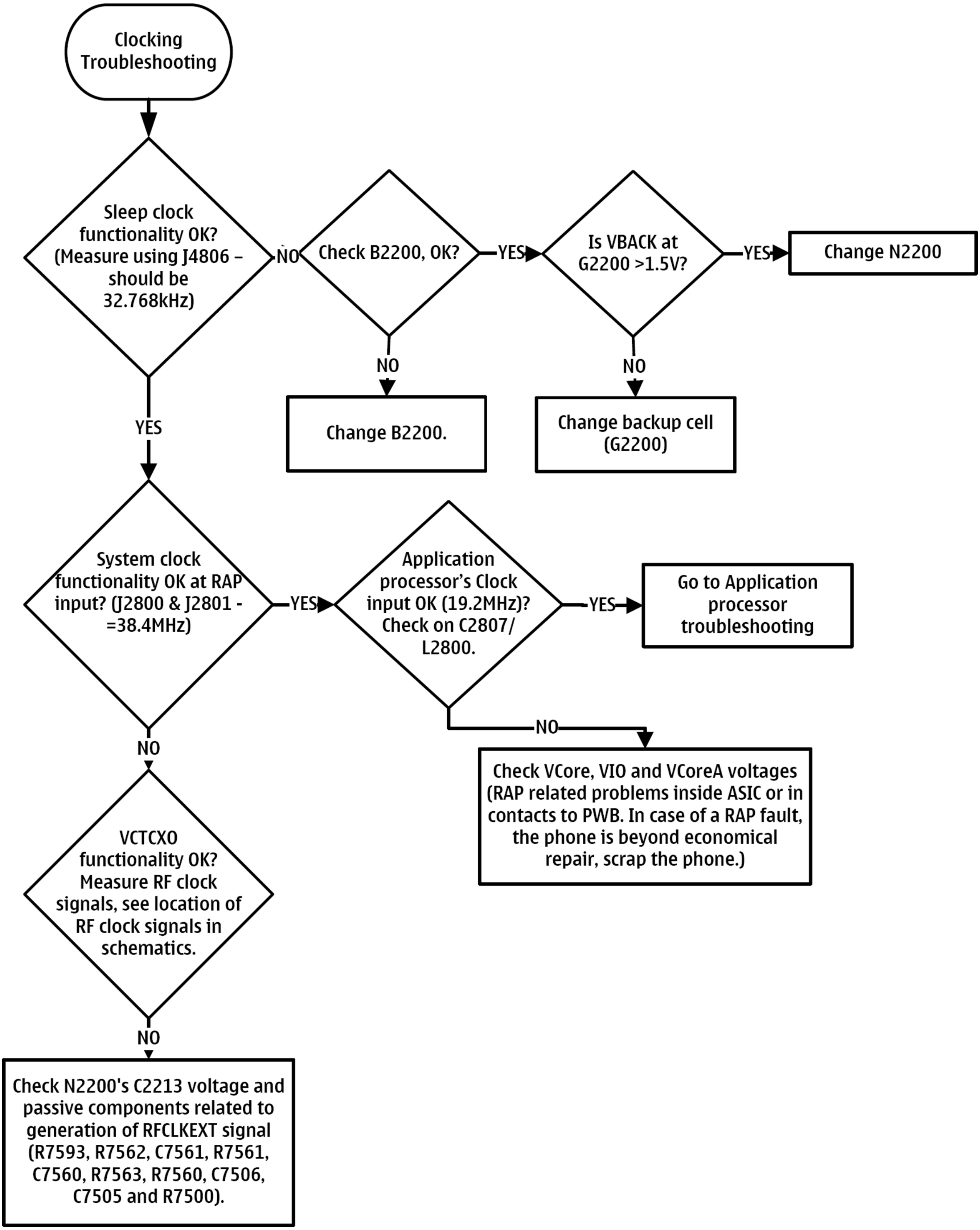
General power checking troubleshooting - APE

Troubleshooting flow


General power checking troubleshooting - APE
YES
NO
Measure VCORE_APE voltage from C4205. VCORE_APE = 1.2V/1.3V/1.4V?
NO
Voltage at C4209. = VBAT?
YES
Is VCORE_APE short circuited?
YES
Change N4200
Still short circuit in VCORE_APE line?
NO
Change L4200, C4209
NO
Check L4203 and C4205. If OK change N4200
YES
Beyond economical repair
YES
Measure VPLL_APE voltage from C4312 VPLL_APE = 1.3V (1.26V–1.34V)?
NO
Check C4312. If OK, change N4200
VPLL_APE voltage OK?
NO
Beyond economical repair
YES
YES
NO
Measure VIO_APE voltage from C4216. VIO_APE = 1.8V (1.71V-1.89V)?
NO
Voltage at C4201. = VBAT?
YES
Is VIO_APE short circuited?
YES
Remove all flexes/ PWBs/modules from main PWB
NO
Change L4201, C4201
NO
Check L4205 and C4216. If OK change N4200
Still short circuit in VIO_APE line?
YES
Are some components heating up?
YES
Go to Clocking troubleshooting
NO
Repair / change faulty flex/PWB/ module
YES
Change these components (if possible)

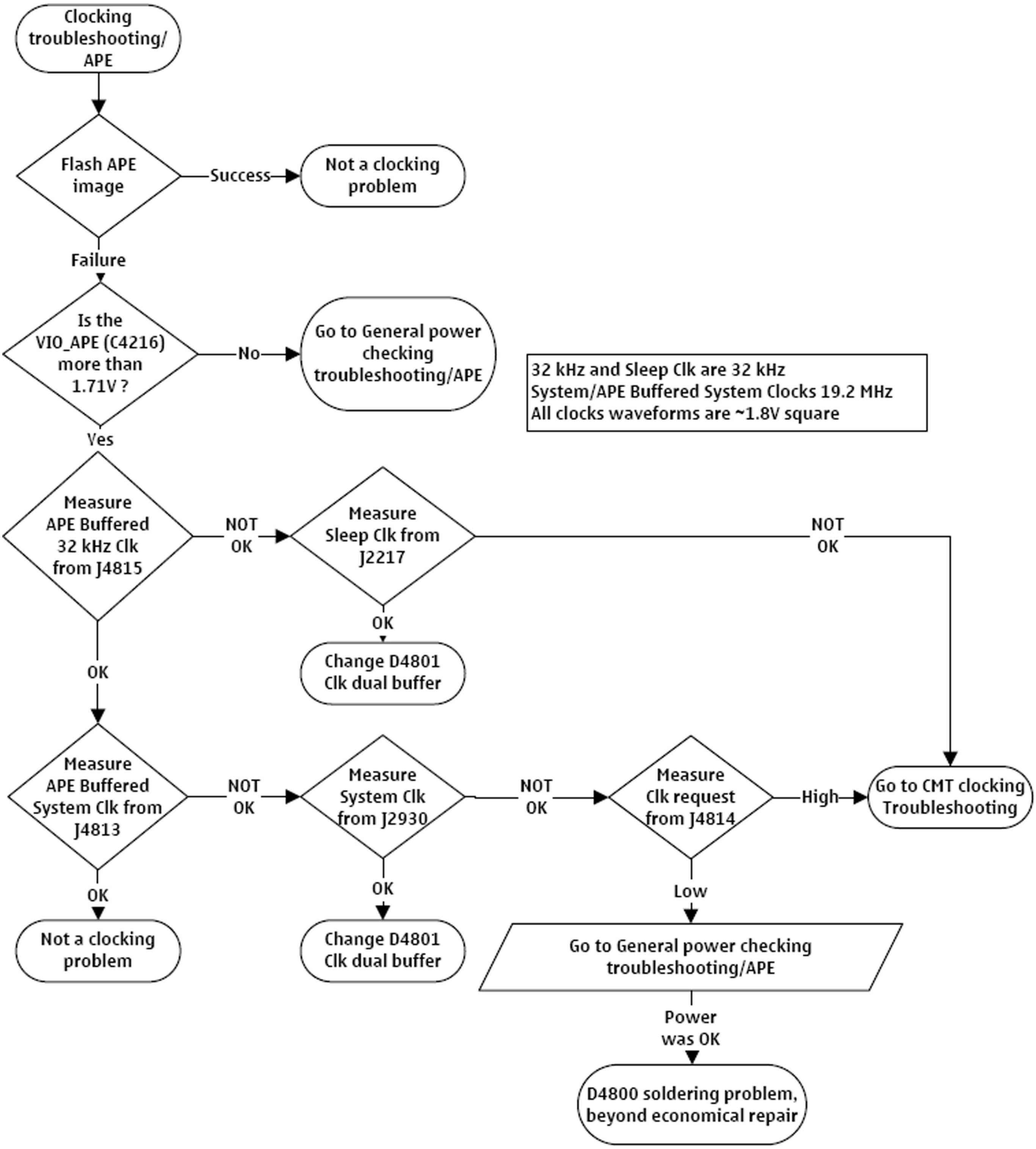
CMT clocking troubleshooting

Troubleshooting flow


Clocking Troubleshooting
Sleep clock functionality OK? (Measure using J4806 – should be 32.768kHz)
NO
Check B2200, OK?
YES
Is VBACK at G2200 >1.5V?
YES
Change N2200
NO
Change B2200.
NO
Change backup cell (G2200)
YES
System clock functionality OK at RAP input? (J2800 & J2801 - =38.4MHz)
YES
Application processor's Clock input OK (19.2MHz)? Check on C2807/ L2800.
YES
Go to Application processor troubleshooting
NO
Check VCore, VIO and VCoreA voltages (RAP related problems inside ASIC or in contacts to PWB. In case of a RAP fault, the phone is beyond economical repair, scrap the phone.)
NO
VCTCXO functionality OK? Measure RF clock signals, see location of RF clock signals in schematics.
NO
Check N2200's C2213 voltage and passive components related to generation of RFCLKEXT signal (R7593, R7562, C7561, R7561, C7560, R7563, R7560, C7506, C7505 and R7500).

APE clocking troubleshooting

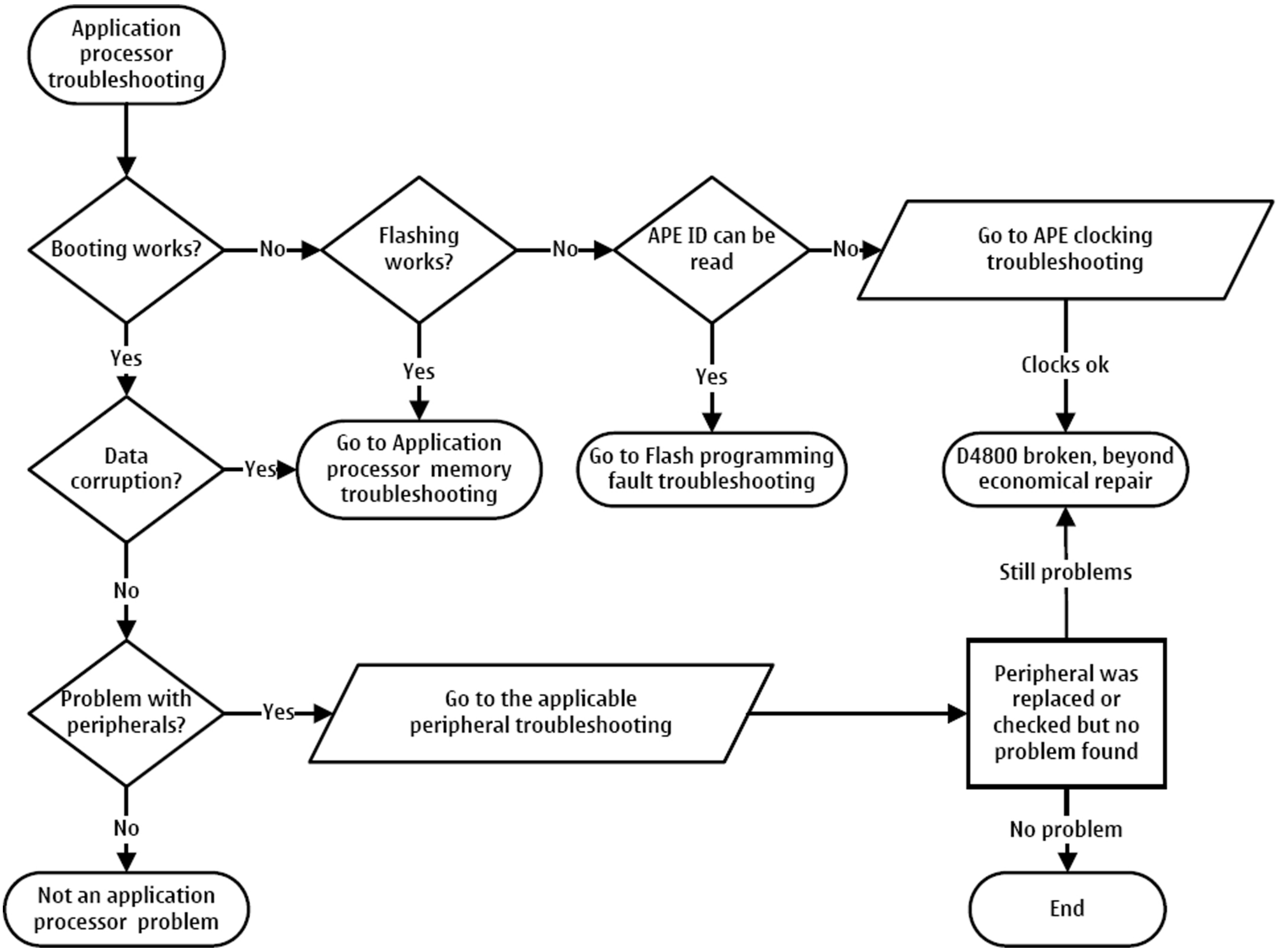
Troubleshooting flow


Clocking troubleshooting/ APE
Flash APE image
Success
Not a clocking problem
Failure
Is the VIO_APE (C4216) more than 1.71V ?
No
Go to General power checking troubleshooting/APE
Yes
Measure APE Buffered 32 kHz Clk from J4815
NOT OK
Measure Sleep Clk from J2217
NOT OK
OK
Change D4801 Clk dual buffer
OK
Measure APE Buffered System Clk from J4813
NOT OK
Measure System Clk from J2930
NOT OK
Measure Clk request from J4814
High
Go to CMT clocking Troubleshooting
OK
Not a clocking problem
OK
Change D4801 Clk dual buffer
Low
Go to General power checking troubleshooting/APE
Power was OK
D4800 soldering problem, beyond economical repair

32 kHz and Sleep Clk are 32 kHz
System/APE Buffered System Clocks 19.2 MHz
All clocks waveforms are ~1.8V square

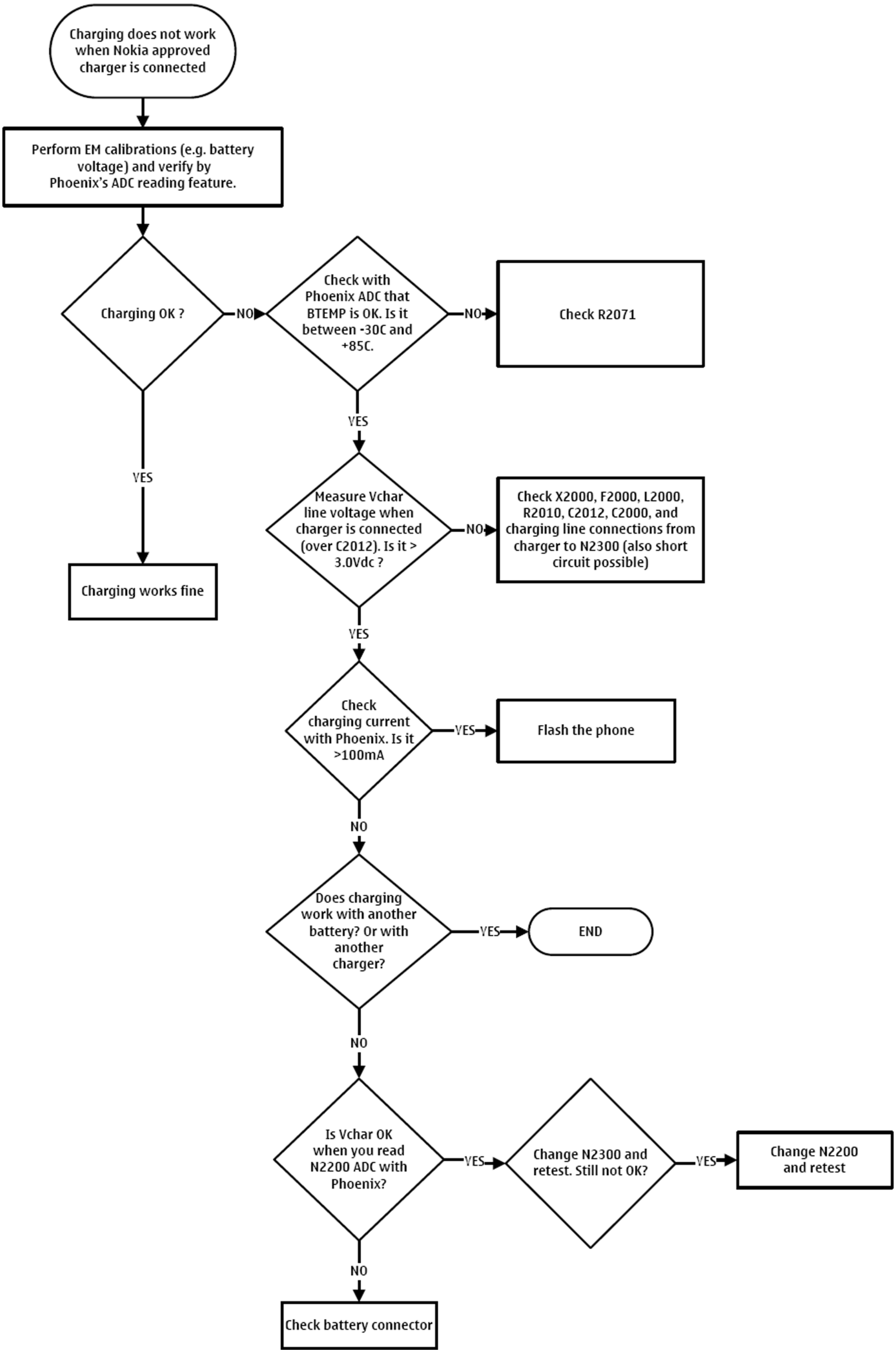
Application processor troubleshooting

Troubleshooting flow


Application processor troubleshooting
Booting works?
No
Flashing works?
No
APE ID can be read
No
Go to APE clocking troubleshooting
Yes
Yes
Yes
Clocks ok
Data corruption?
Yes
Go to Application processor memory troubleshooting
Go to Flash programming fault troubleshooting
D4800 broken, beyond economical repair
Still problems
No
Problem with peripherals?
Yes
Go to the applicable peripheral troubleshooting
Peripheral was replaced or checked but no problem found
No
No problem
Not an application processor problem
End

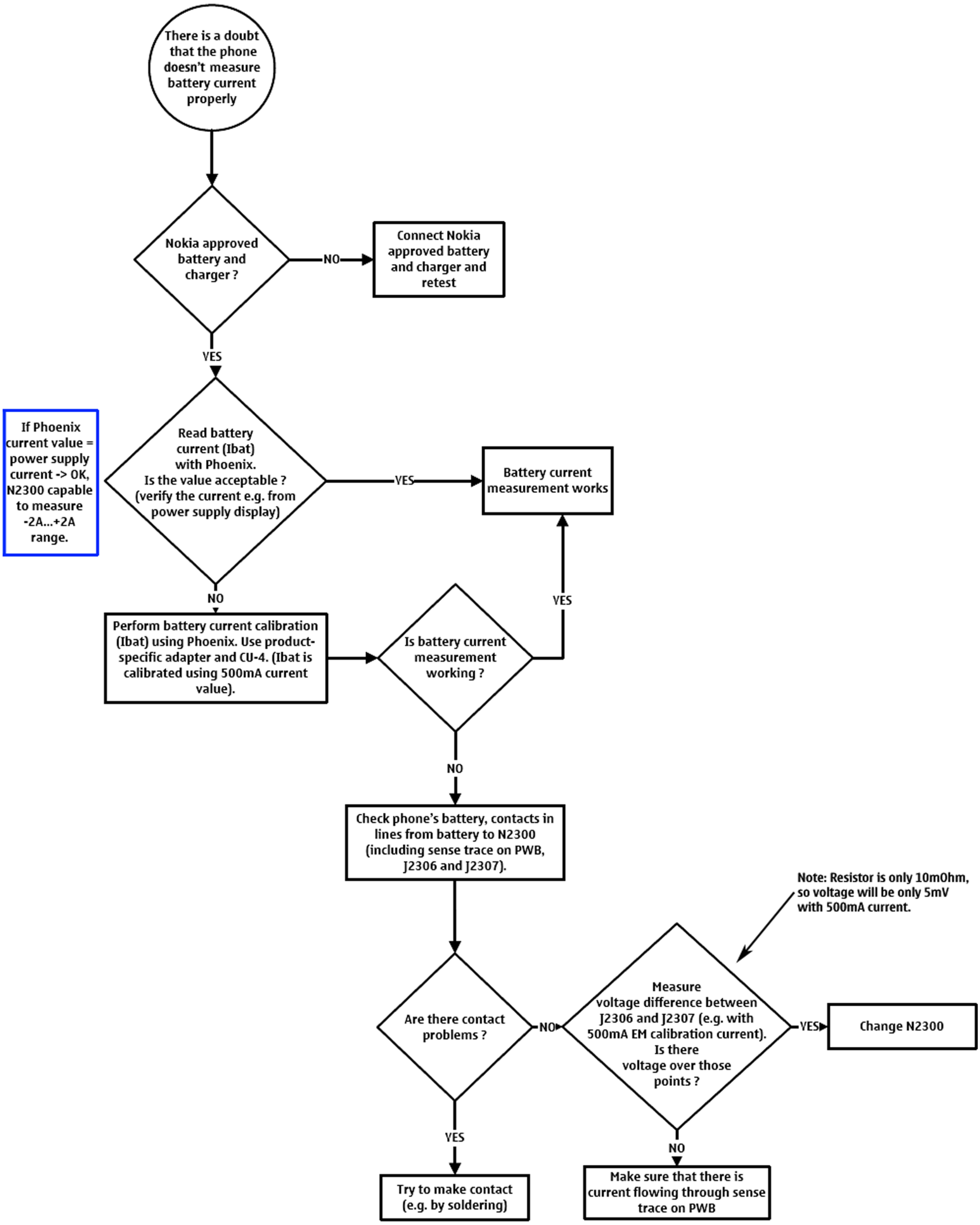
Charging troubleshooting

Troubleshooting flow


Charging does not work when Nokia approved charger is connected
Perform EM calibrations (e.g. battery voltage) and verify by Phoenix's ADC reading feature.
Charging OK ?
NO
Check with Phoenix ADC that BTEMP is OK. Is it between -30C and +85C.
NO
Check R2071
YES
YES
Charging works fine
Measure Vchar line voltage when charger is connected (over C2012). Is it > 3.0Vdc ?
NO
Check X2000, F2000, L2000, R2010, C2012, C2000, and charging line connections from charger to N2300 (also short circuit possible)
YES
Check charging current with Phoenix. Is it >100mA
YES
Flash the phone
NO
Does charging work with another battery? Or with another charger?
YES
END
NO
Is Vchar OK when you read N2200 ADC with Phoenix?
YES
Change N2300 and retest. Still not OK?
YES
Change N2200 and retest
NO
Check battery connector

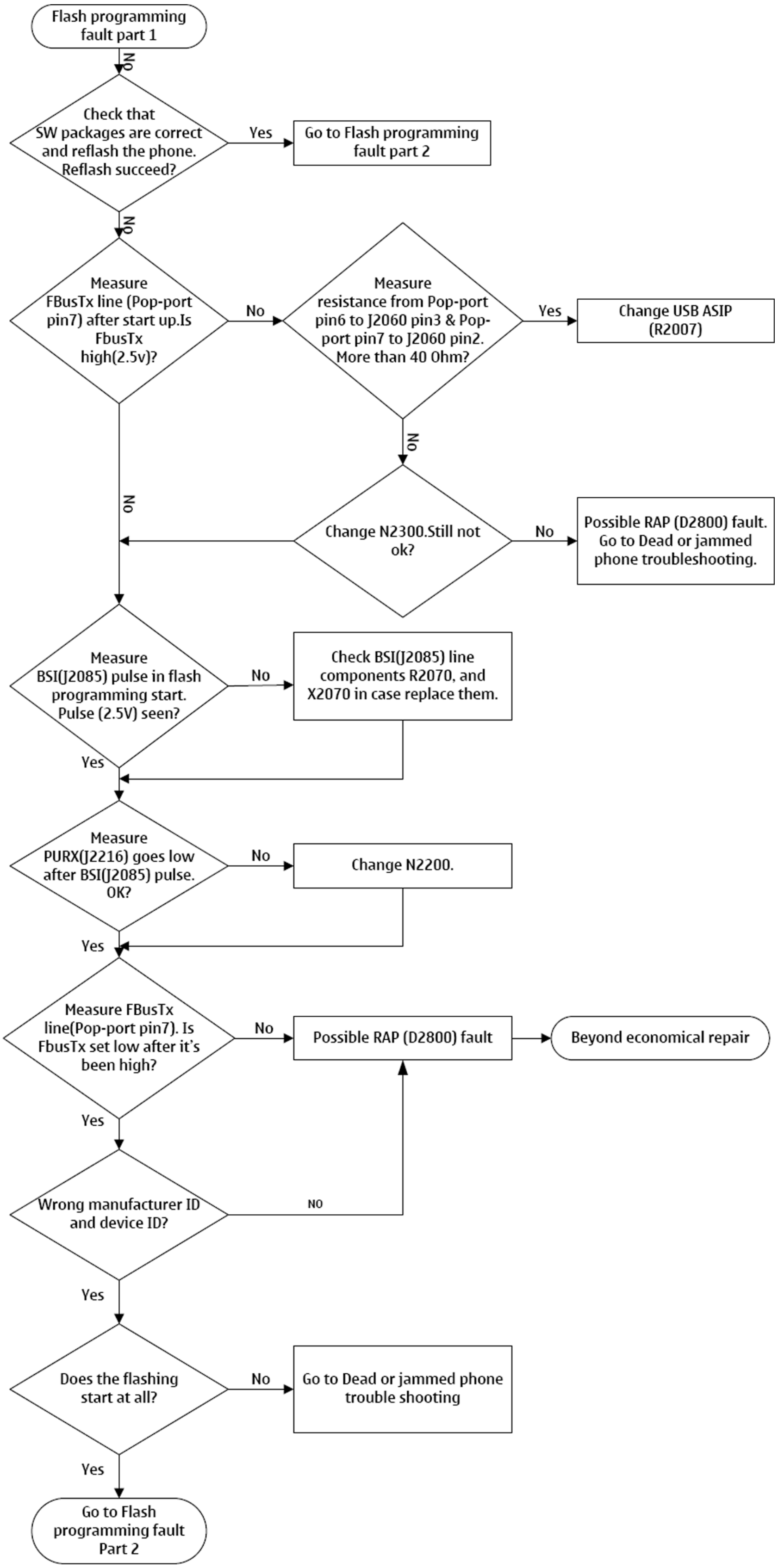
Battery current measuring fault troubleshooting

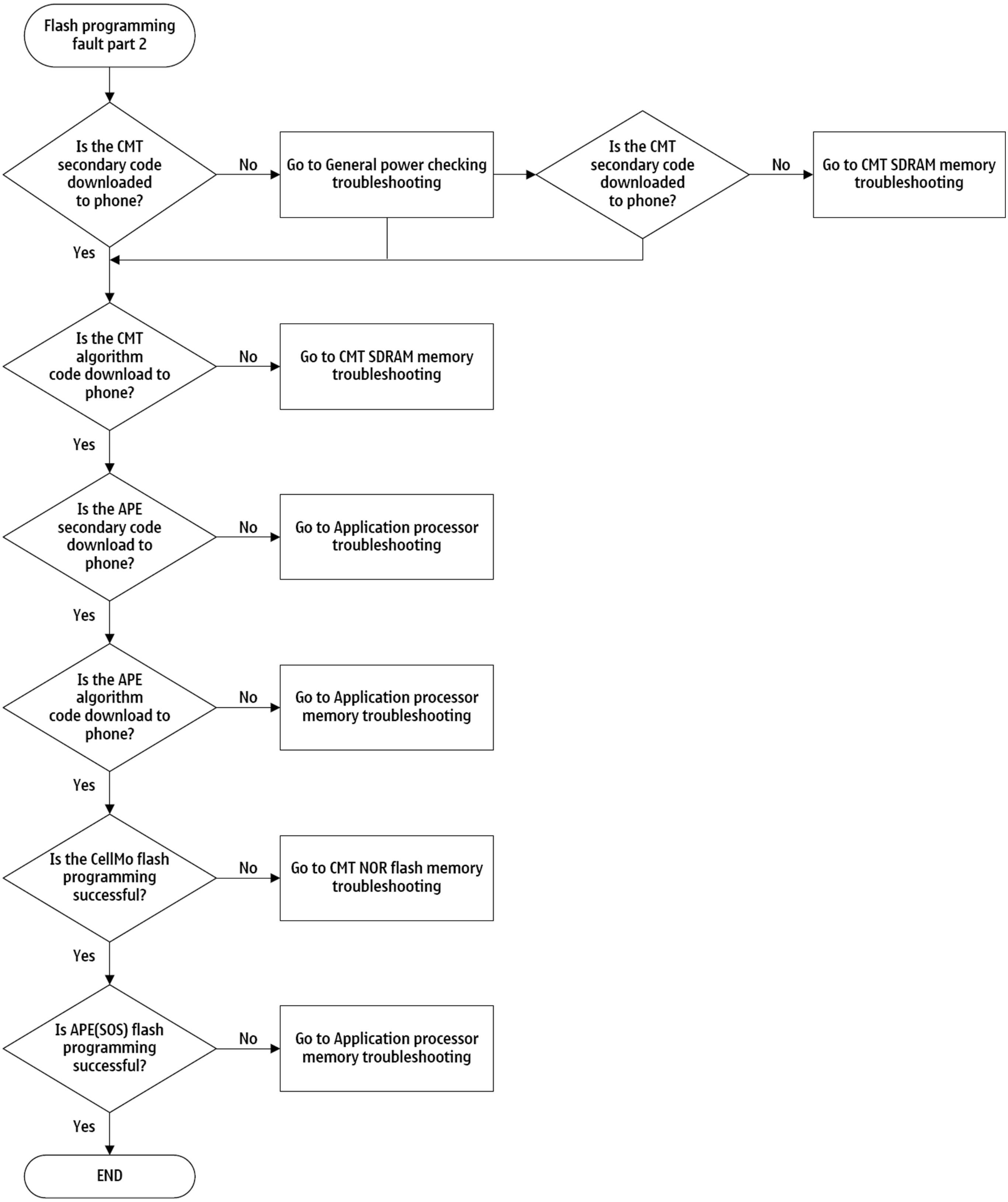
Troubleshooting flow


There is a doubt that the phone doesn't measure battery current properly
Nokia approved battery and charger ?
NO
Connect Nokia approved battery and charger and retest
YES
If Phoenix current value = power supply current -> OK, N2300 capable to measure -2A...+2A range.
Read battery current (Ibat) with Phoenix. Is the value acceptable ? (verify the current e.g. from power supply display)
YES
Battery current measurement works
NO
Perform battery current calibration (Ibat) using Phoenix. Use product-specific adapter and CU-4. (Ibat is calibrated using 500mA current value).
Is battery current measurement working ?
YES
NO
Check phone's battery, contacts in lines from battery to N2300 (including sense trace on PWB, J2306 and J2307).
Note: Resistor is only 10mOhm, so voltage will be only 5mV with 500mA current.
Are there contact problems ?
NO
Measure voltage difference between J2306 and J2307 (e.g. with 500mA EM calibration current). Is there voltage over those points ?
YES
Change N2300
YES
Try to make contact (e.g. by soldering)
NO
Make sure that there is current flowing through sense trace on PWB

Flash programming fault troubleshooting

Troubleshooting flow


Flash programming fault part 1
NO
Check that SW packages are correct and reflash the phone. Reflash succeed?
Yes
Go to Flash programming fault part 2
NO
Measure FBusTx line (Pop-port pin7) after start up.Is FbusTx high(2.5v)?
No
Measure resistance from Pop-port pin6 to J2060 pin3 & Pop-port pin7 to J2060 pin2. More than 40 Ohm?
Yes
Change USB ASIP (R2007)
NO
NO
Change N2300.Still not ok?
No
Possible RAP (D2800) fault. Go to Dead or jammed phone troubleshooting.
Measure BSI(J2085) pulse in flash programming start. Pulse (2.5V) seen?
No
Check BSI(J2085) line components R2070, and X2070 in case replace them.
Yes
Measure PURX(J2216) goes low after BSI(J2085) pulse. OK?
No
Change N2200.
Yes
Measure FBusTx line(Pop-port pin7). Is FbusTx set low after it's been high?
No
Possible RAP (D2800) fault
Beyond economical repair
Yes
Wrong manufacturer ID and device ID?
NO
Yes
Does the flashing start at all?
No
Go to Dead or jammed phone trouble shooting
Yes
Go to Flash programming fault Part 2

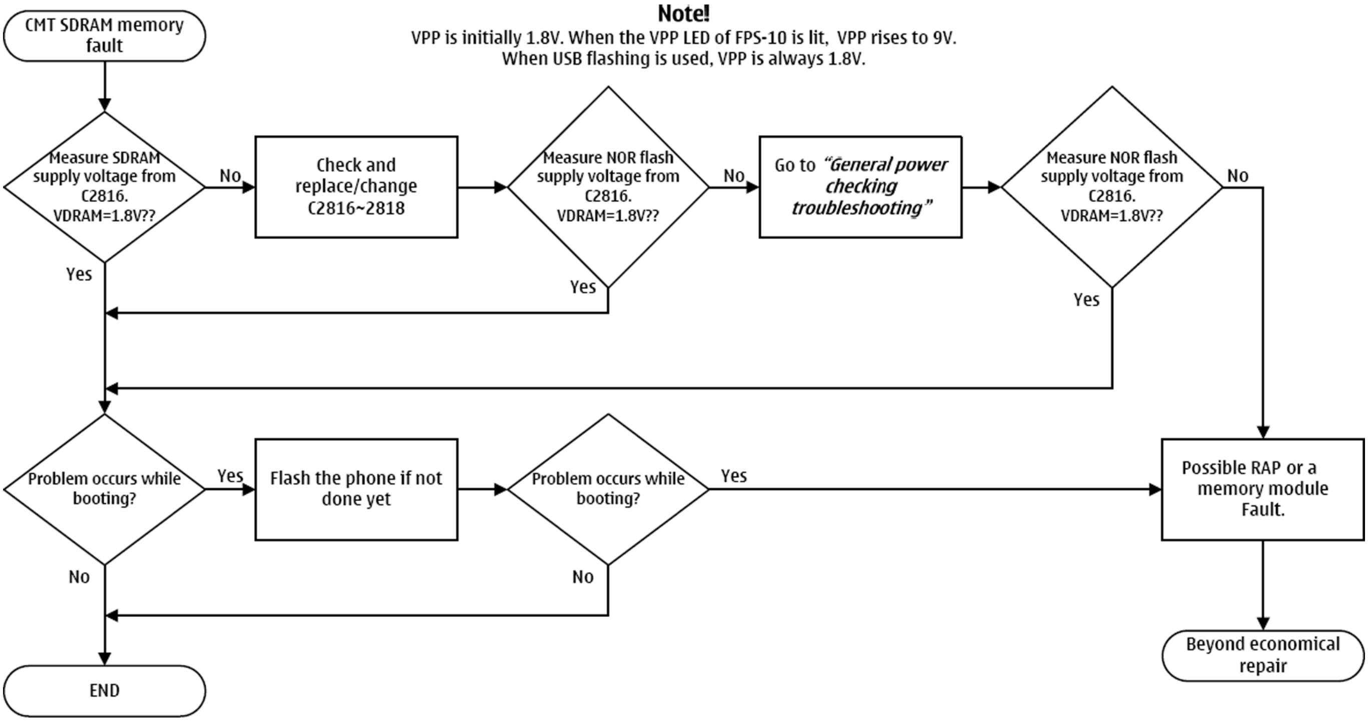

Flash programming fault part 2
Is the CMT secondary code downloaded to phone?
No
Go to General power checking troubleshooting
Is the CMT secondary code downloaded to phone?
No
Go to CMT SDRAM memory troubleshooting
Yes
Is the CMT algorithm code download to phone?
No
Go to CMT SDRAM memory troubleshooting
Yes
Is the APE secondary code download to phone?
No
Go to Application processor troubleshooting
Yes
Is the APE algorithm code download to phone?
No
Go to Application processor memory troubleshooting
Yes
Is the CellMo flash programming successful?
No
Go to CMT NOR flash memory troubleshooting
Yes
Is APE(SOS) flash programming successful?
No
Go to Application processor memory troubleshooting
Yes
END

CMT SDRAM memory fault troubleshooting

Context

CMT SDRAM memory is located in a memory module, which is integrated to RAP. RAP is not a changeable component. Therefore, if there is a fault in the CMT SDRAM memory, the device is beyond economical repair.

Troubleshooting flow

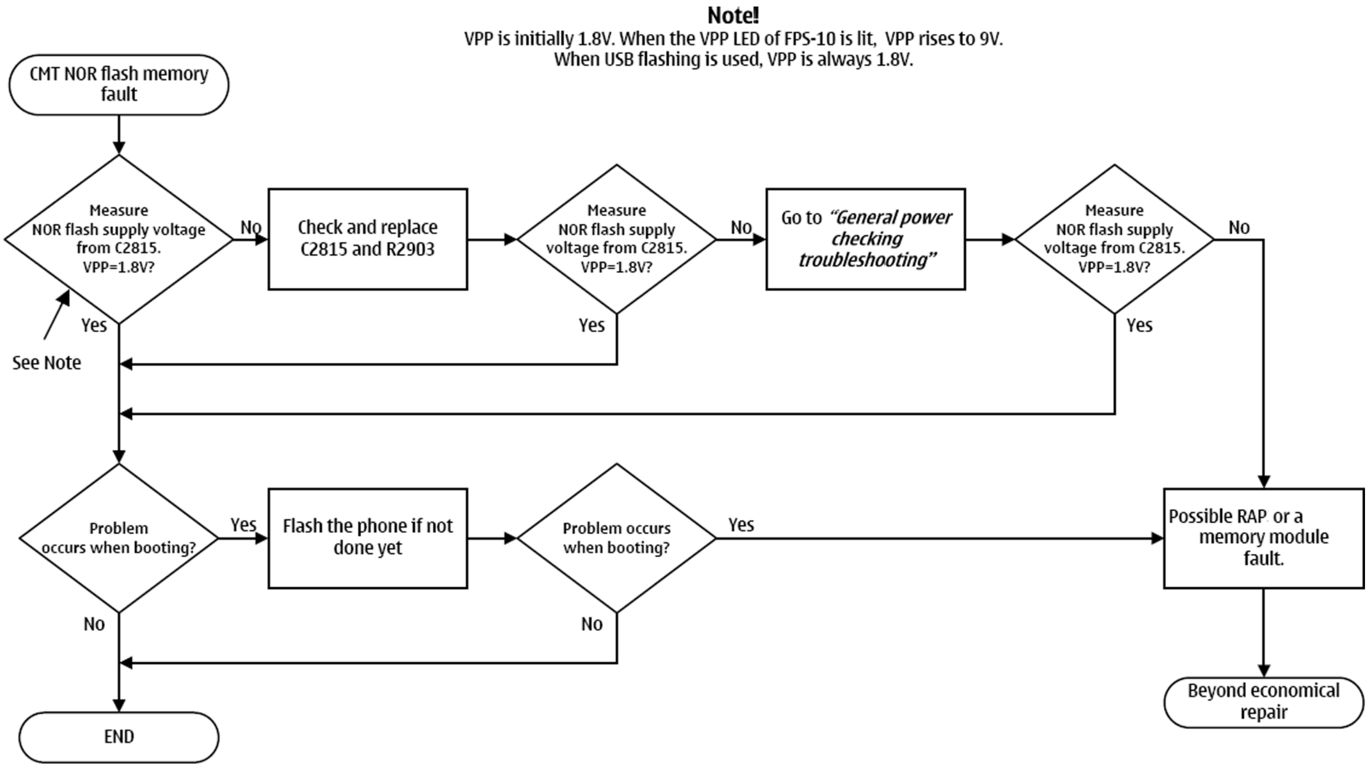

Note!
VPP is initially 1.8V. When the VPP LED of FPS-10 is lit, VPP rises to 9V.
When USB flashing is used, VPP is always 1.8V.
CMT SDRAM memory fault
Measure SDRAM supply voltage from C2816. VDRAM=1.8V??
No
Check and replace/change C2816~2818
Measure NOR flash supply voltage from C2816. VDRAM=1.8V??
No
Go to *"General power checking troubleshooting"*
Measure NOR flash supply voltage from C2816. VDRAM=1.8V??
No
Yes
Yes
Yes
Problem occurs while booting?
Yes
Flash the phone if not done yet
Problem occurs while booting?
Yes
Possible RAP or a memory module Fault.
No
No
END
Beyond economical repair

CMT NOR flash fault troubleshooting

Context

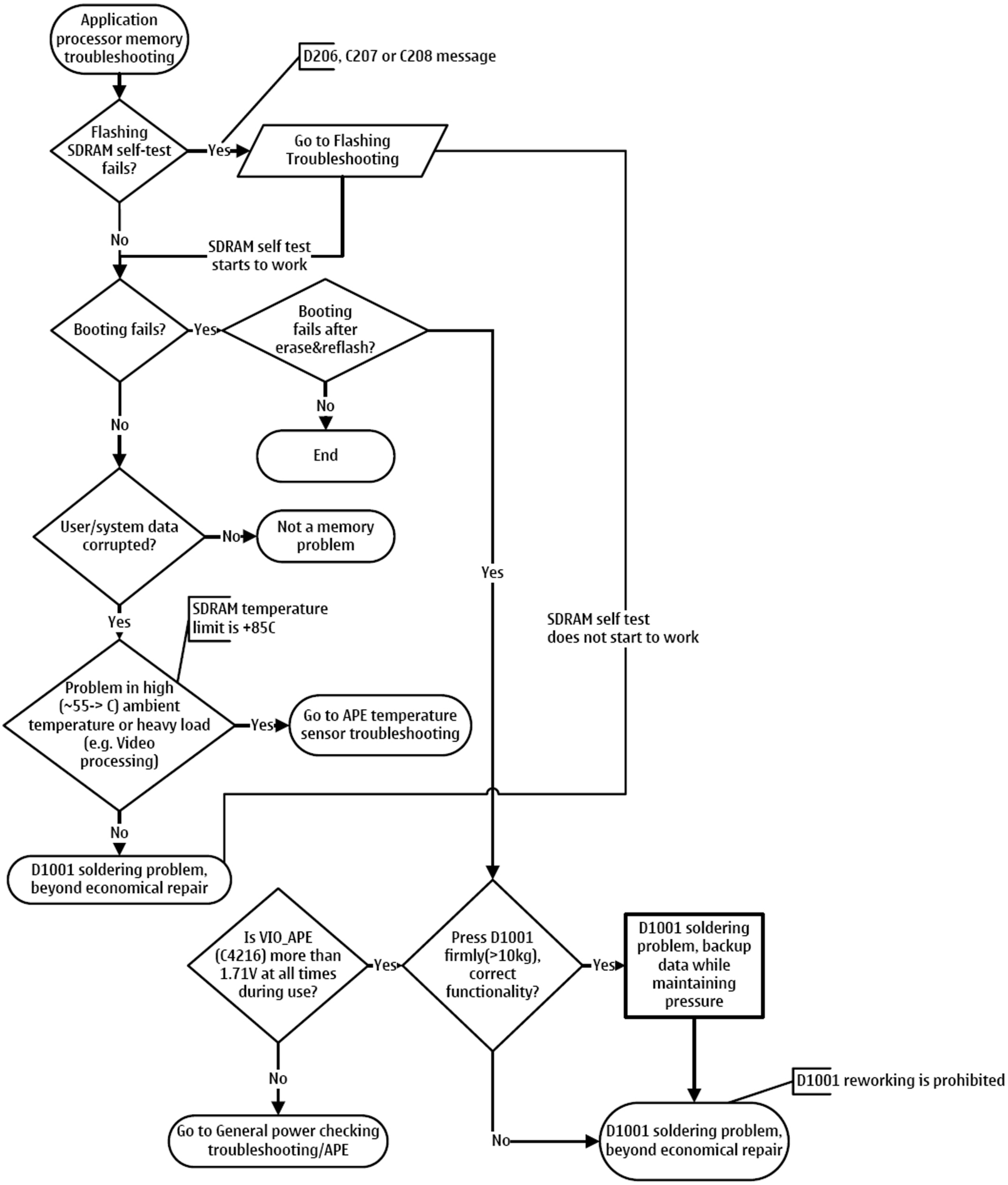
CMT NOR flash memory is located in a memory module, which is integrated to RAP. RAP is not a changeable component. Therefore, if there is a fault in the CMT NOR flash memory, the device is beyond economical repair.

Troubleshooting flow


Note!
VPP is initially 1.8V. When the VPP LED of FPS-10 is lit, VPP rises to 9V.
When USB flashing is used, VPP is always 1.8V.
CMT NOR flash memory fault
Measure NOR flash supply voltage from C2815. VPP=1.8V?
No
Check and replace C2815 and R2903
Measure NOR flash supply voltage from C2815. VPP=1.8V?
No
Go to "General power checking troubleshooting"
Measure NOR flash supply voltage from C2815. VPP=1.8V?
No
Yes
See Note
Yes
Yes
Problem occurs when booting?
Yes
Flash the phone if not done yet
Problem occurs when booting?
Yes
Possible RAP or a memory module fault.
No
No
END
Beyond economical repair

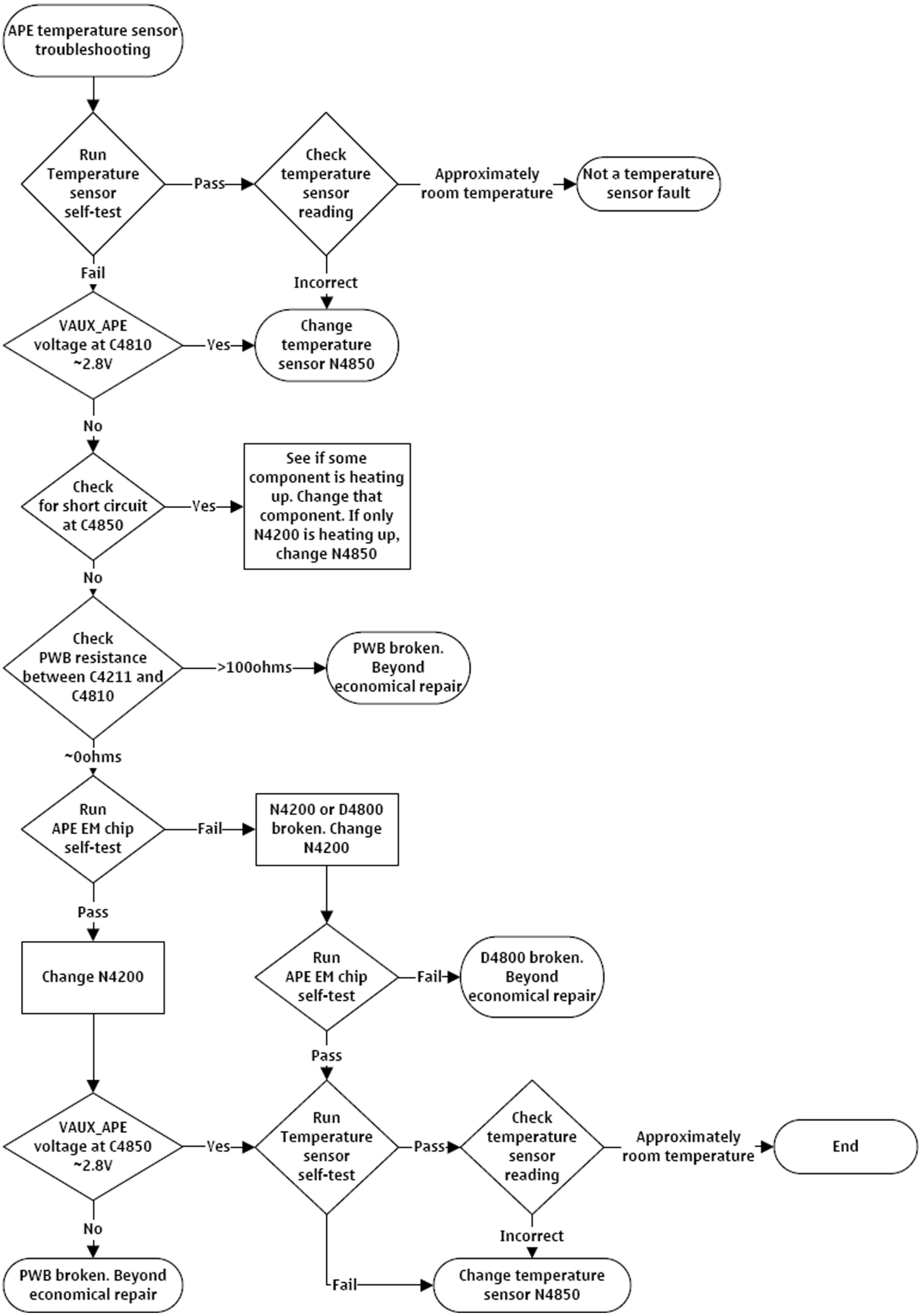
Application processor memory troubleshooting

Troubleshooting flow


Application processor memory troubleshooting
D206, C207 or C208 message
Flashing SDRAM self-test fails?
Yes
Go to Flashing Troubleshooting
No
SDRAM self test starts to work
Booting fails?
Yes
Booting fails after erase&reflash?
No
End
No
User/system data corrupted?
No
Not a memory problem
Yes
SDRAM self test does not start to work
Yes
SDRAM temperature limit is +85C
Problem in high (~55-> C) ambient temperature or heavy load (e.g. Video processing)
Yes
Go to APE temperature sensor troubleshooting
No
D1001 soldering problem, beyond economical repair
Is VIO_APE (C4216) more than 1.71V at all times during use?
Yes
Press D1001 firmly(>10kg), correct functionality?
Yes
D1001 soldering problem, backup data while maintaining pressure
No
Go to General power checking troubleshooting/APE
No
D1001 reworking is prohibited
D1001 soldering problem, beyond economical repair

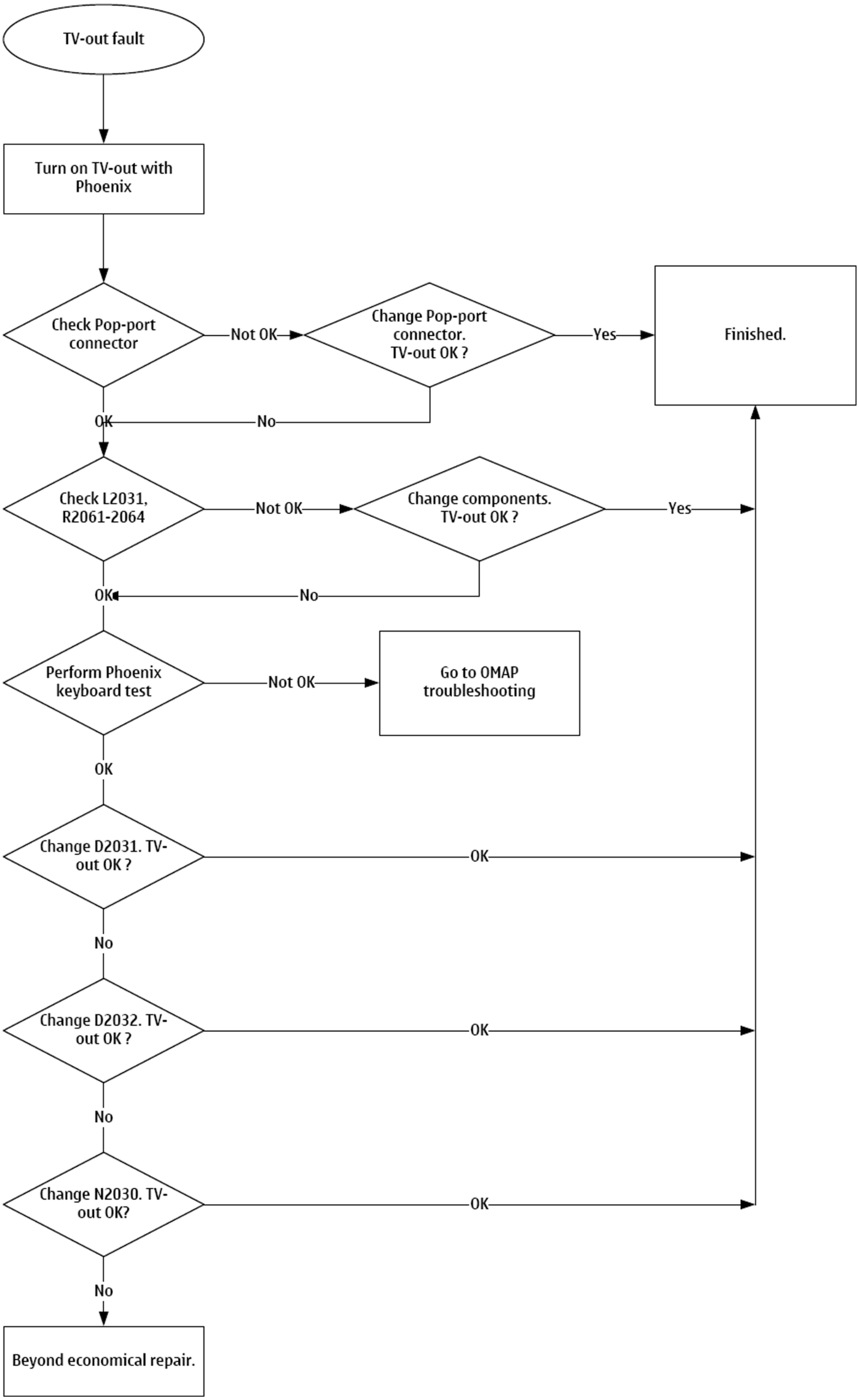
APE temperature sensor troubleshooting

Troubleshooting flow


APE temperature sensor troubleshooting
Run Temperature sensor self-test
Pass
Check temperature sensor reading
Approximately room temperature
Not a temperature sensor fault
Incorrect
Change temperature sensor N4850
Fail
VAUX_APE voltage at C4810 ~2.8V
Yes
No
Check for short circuit at C4850
Yes
See if some component is heating up. Change that component. If only N4200 is heating up, change N4850
No
Check PWB resistance between C4211 and C4810
>100ohms
PWB broken. Beyond economical repair
~0ohms
Run APE EM chip self-test
Fail
N4200 or D4800 broken. Change N4200
Pass
Change N4200
Run APE EM chip self-test
Fail
D4800 broken. Beyond economical repair
Pass
VAUX_APE voltage at C4850 ~2.8V
Yes
Run Temperature sensor self-test
Pass
Check temperature sensor reading
Approximately room temperature
End
No
PWB broken. Beyond economical repair
Fail
Incorrect
Change temperature sensor N4850

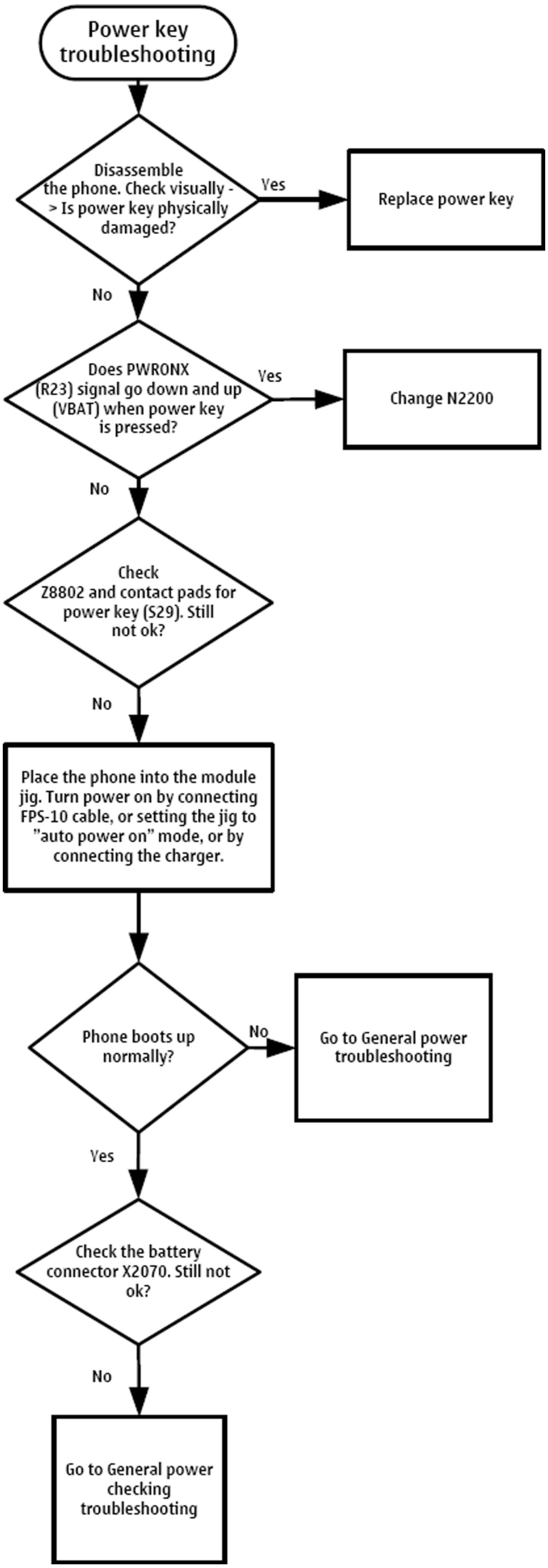
TV-out troubleshooting

Troubleshooting flow


TV-out fault
Turn on TV-out with Phoenix
Check Pop-port connector
Not OK
Change Pop-port connector. TV-out OK ?
Yes
Finished.
OK
No
Check L2031, R2061-2064
Not OK
Change components. TV-out OK ?
Yes
OK
No
Perform Phoenix keyboard test
Not OK
Go to OMAP troubleshooting
OK
Change D2031. TV-out OK ?
OK
No
Change D2032. TV-out OK ?
OK
No
Change N2030. TV-out OK?
OK
No
Beyond economical repair.

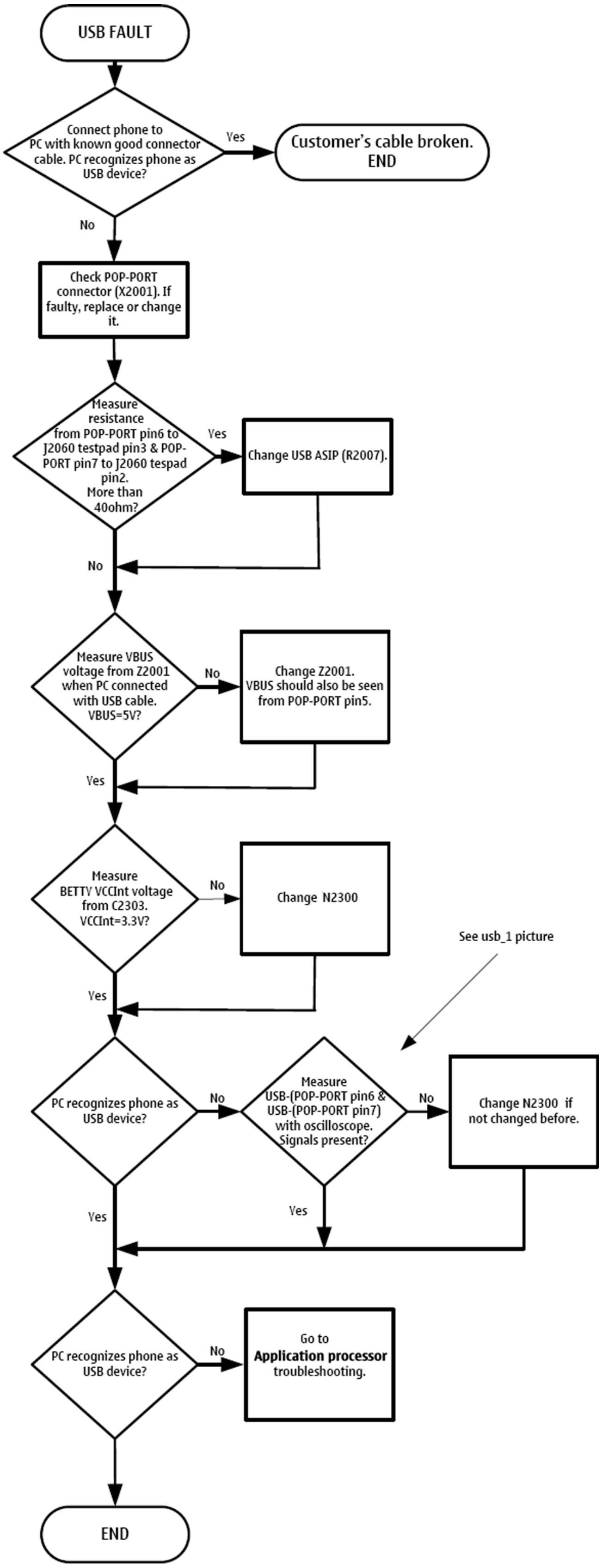
Power key troubleshooting

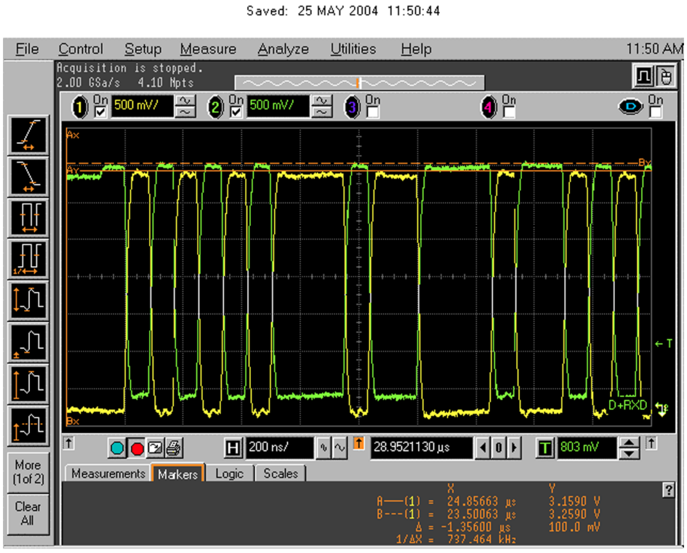
Troubleshooting flow


Power key troubleshooting
Disassemble the phone. Check visually -> Is power key physically damaged?
Yes
Replace power key
No
Does PWRONX (R23) signal go down and up (VBAT) when power key is pressed?
Yes
Change N2200
No
Check Z8802 and contact pads for power key (S29). Still not ok?
No
Place the phone into the module jig. Turn power on by connecting FPS-10 cable, or setting the jig to "auto power on" mode, or by connecting the charger.
Phone boots up normally?
No
Go to General power troubleshooting
Yes
Check the battery connector X2070. Still not ok?
No
Go to General power checking troubleshooting

USB interface troubleshooting

Troubleshooting flow


USB FAULT
Connect phone to PC with known good connector cable. PC recognizes phone as USB device?
Yes
Customer's cable broken. END
No
Check POP-PORT connector (X2001). If faulty, replace or change it.
Measure resistance from POP-PORT pin6 to J2060 testpad pin3 & POP-PORT pin7 to J2060 tespad pin2. More than 40ohm?
Yes
Change USB ASIP (R2007).
No
Measure VBUS voltage from Z2001 when PC connected with USB cable. VBUS=5V?
No
Change Z2001. VBUS should also be seen from POP-PORT pin5.
Yes
Measure BETTY VCCInt voltage from C2303. VCCInt=3.3V?
No
Change N2300
Yes
See usb_1 picture
PC recognizes phone as USB device?
No
Measure USB-(POP-PORT pin6 & USB-(POP-PORT pin7) with oscilloscope. Signals present?
No
Change N2300 if not changed before.
Yes
Yes
PC recognizes phone as USB device?
No
Go to Application processor troubleshooting.
END



Saved: 25 MAY 2004 11:50:44

```
Acquisition is stopped.
2.00 GSa/s   4.10 Mpts
```

1 On ☑ 500 mV/ 2 On ☑ 500 mV/ 3 On ☐ 4 On ☐ On ☐

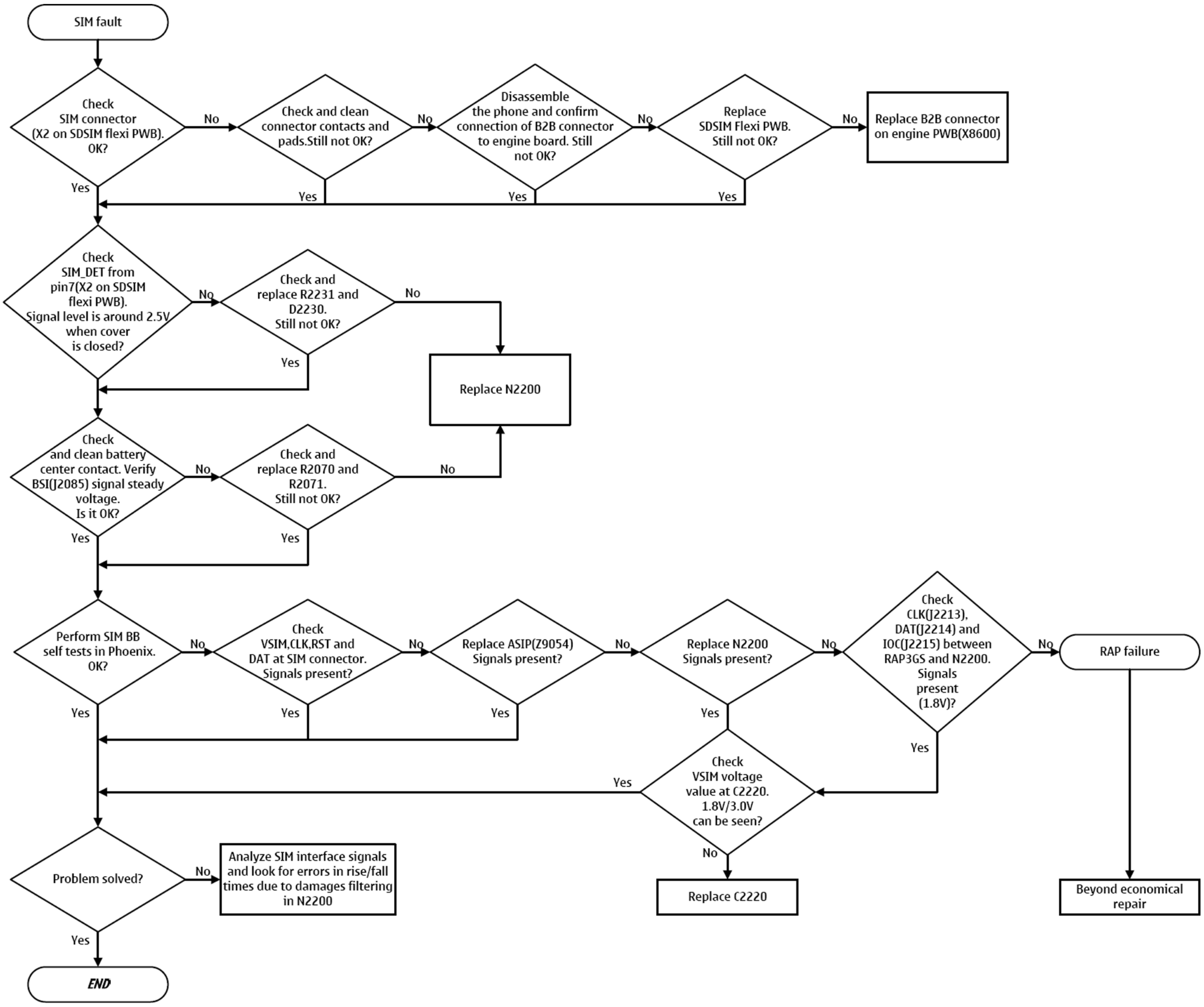
H 200 ns/ 28.9521130 µs T 803 mV

```
                  X                   Y
A——(1) =  24.85663 µs         3.1590 V
B---(1) =  23.50063 µs         3.2590 V
      Δ = -1.35600 µs         100.0 mV
  1/ΔX =  737.464 kHz
```

File
Control
Setup
Measure
Analyze
Utilities
Help
11:50 AM
Ax
Ay
Bx
By
D+RXD
T
More (1of 2)
Clear All
Measurements
Markers
Logic
Scales
?

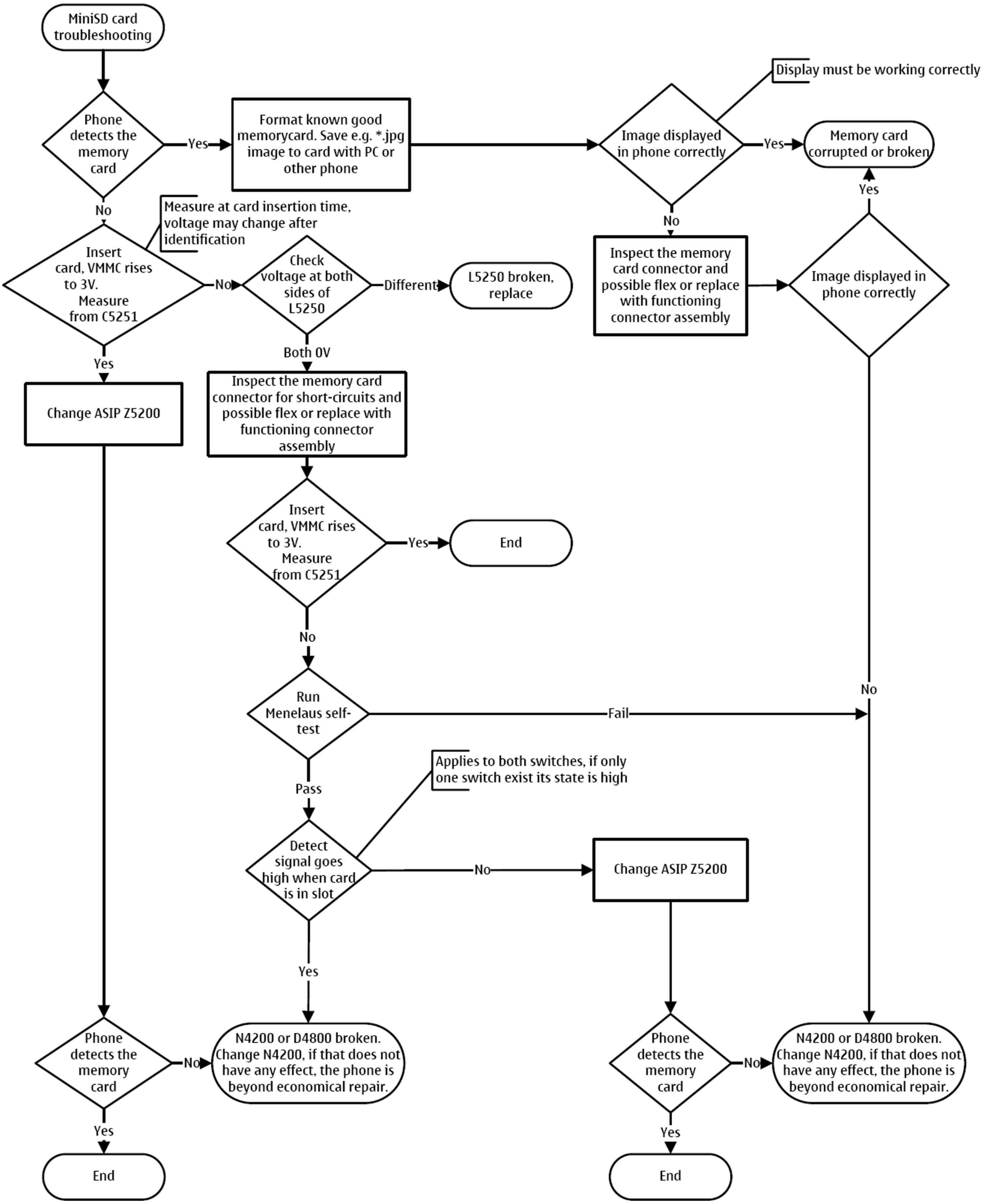
SIM card troubleshooting

Troubleshooting flow


SIM fault
Check SIM connector (X2 on SDSIM flexi PWB). OK?
No
Check and clean connector contacts and pads.Still not OK?
No
Disassemble the phone and confirm connection of B2B connector to engine board. Still not OK?
No
Replace SDSIM Flexi PWB. Still not OK?
No
Replace B2B connector on engine PWB(X8600)
Yes
Yes
Yes
Yes
Check SIM_DET from pin7(X2 on SDSIM flexi PWB). Signal level is around 2.5V when cover is closed?
No
Check and replace R2231 and D2230. Still not OK?
No
Replace N2200
Yes
Check and clean battery center contact. Verify BSI(J2085) signal steady voltage. Is it OK?
No
Check and replace R2070 and R2071. Still not OK?
No
Yes
Yes
Perform SIM BB self tests in Phoenix. OK?
No
Check VSIM,CLK,RST and DAT at SIM connector. Signals present?
No
Replace ASIP(Z9054) Signals present?
No
Replace N2200 Signals present?
No
Check CLK(J2213), DAT(J2214) and IOC(J2215) between RAP3GS and N2200. Signals present (1.8V)?
No
RAP failure
Yes
Yes
Yes
Yes
Yes
Check VSIM voltage value at C2220. 1.8V/3.0V can be seen?
Yes
No
Replace C2220
Beyond economical repair
Problem solved?
No
Analyze SIM interface signals and look for errors in rise/fall times due to damages filtering in N2200
Yes
END

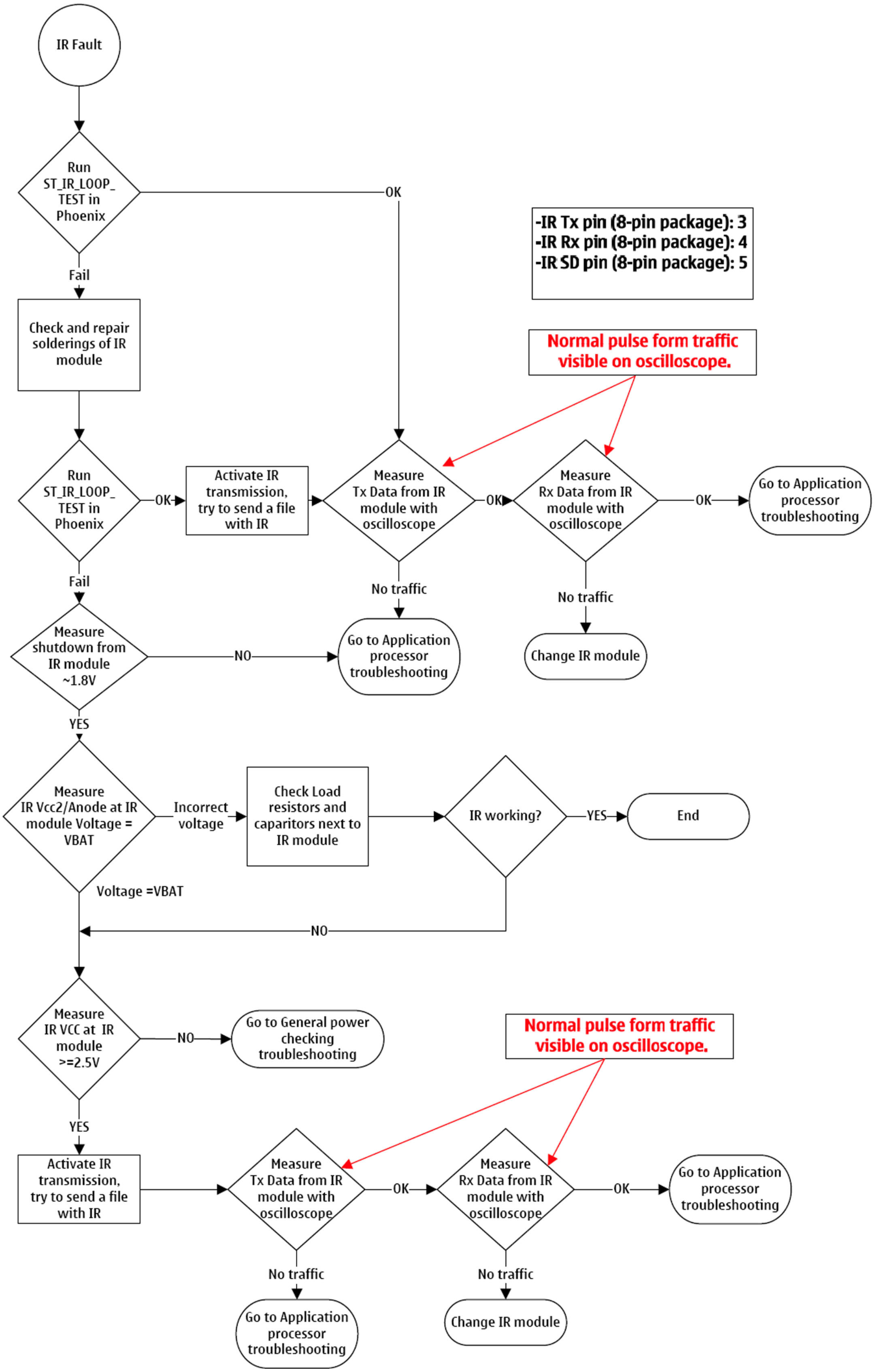
MiniSD troubleshooting

Troubleshooting flow


MiniSD card troubleshooting
Phone detects the memory card
Yes
Format known good memorycard. Save e.g. *.jpg image to card with PC or other phone
Image displayed in phone correctly
Display must be working correctly
Yes
Memory card corrupted or broken
No
Measure at card insertion time, voltage may change after identification
Insert card, VMMC rises to 3V. Measure from C5251
No
Check voltage at both sides of L5250
Different
L5250 broken, replace
No
Inspect the memory card connector and possible flex or replace with functioning connector assembly
Image displayed in phone correctly
Yes
Yes
Change ASIP Z5200
Both 0V
Inspect the memory card connector for short-circuits and possible flex or replace with functioning connector assembly
Insert card, VMMC rises to 3V. Measure from C5251
Yes
End
No
Run Menelaus self-test
Fail
No
Pass
Applies to both switches, if only one switch exist its state is high
Detect signal goes high when card is in slot
No
Change ASIP Z5200
Yes
Phone detects the memory card
No
N4200 or D4800 broken. Change N4200, if that does not have any effect, the phone is beyond economical repair.
Phone detects the memory card
No
N4200 or D4800 broken. Change N4200, if that does not have any effect, the phone is beyond economical repair.
Yes
End
Yes
End

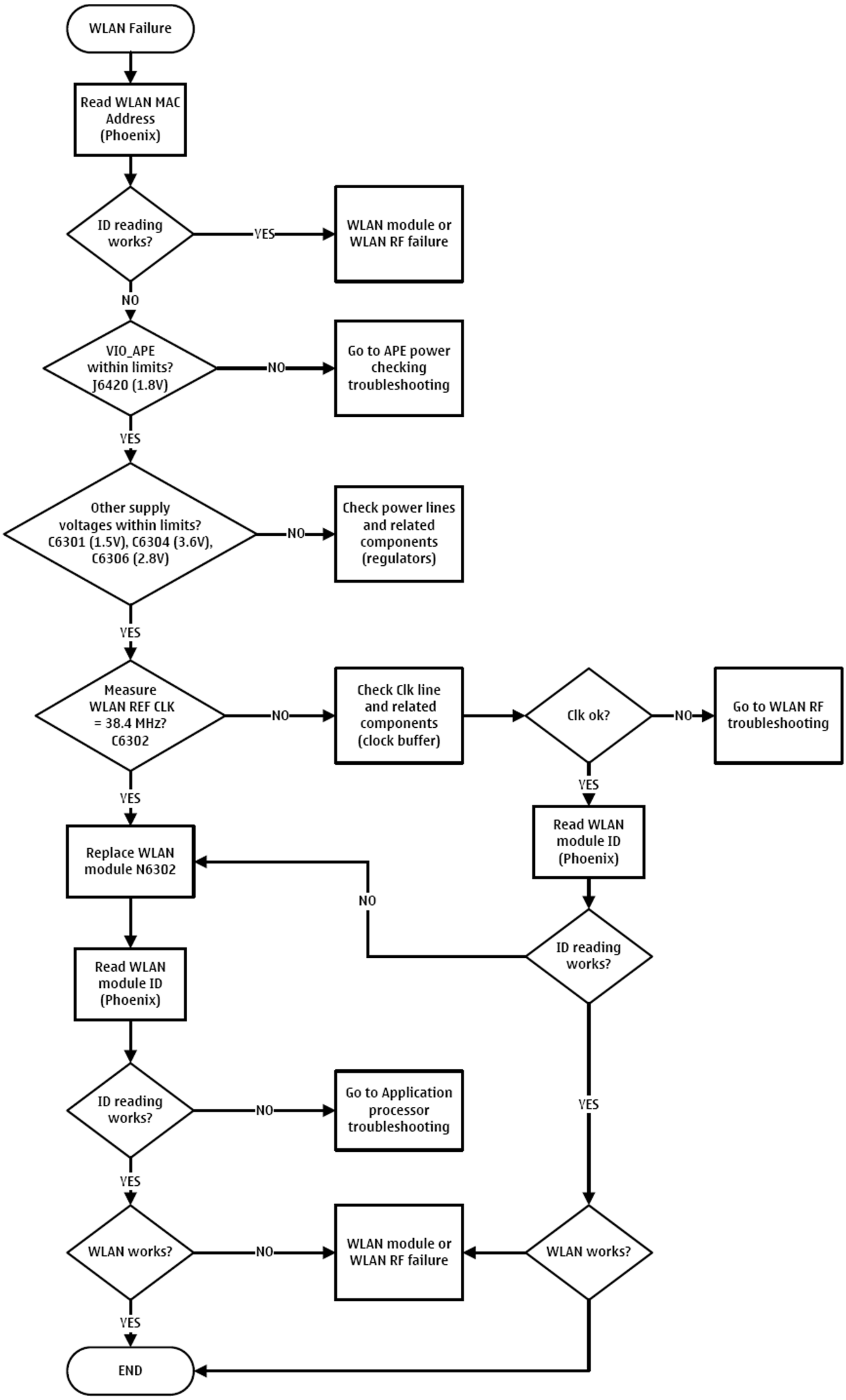
Irda troubleshooting

Troubleshooting flow


IR Fault
Run ST_IR_LOOP_ TEST in Phoenix
OK
Fail
Check and repair solderings of IR module
-IR Tx pin (8-pin package): 3
-IR Rx pin (8-pin package): 4
-IR SD pin (8-pin package): 5
Normal pulse form traffic visible on oscilloscope.
Run ST_IR_LOOP_ TEST in Phoenix
OK
Activate IR transmission, try to send a file with IR
Measure Tx Data from IR module with oscilloscope
OK
Measure Rx Data from IR module with oscilloscope
OK
Go to Application processor troubleshooting
Fail
No traffic
No traffic
Measure shutdown from IR module ~1.8V
NO
Go to Application processor troubleshooting
Change IR module
YES
Measure IR Vcc2/Anode at IR module Voltage = VBAT
Incorrect voltage
Check Load resistors and caparitors next to IR module
IR working?
YES
End
Voltage =VBAT
NO
Measure IR VCC at IR module >=2.5V
NO
Go to General power checking troubleshooting
Normal pulse form traffic visible on oscilloscope.
YES
Activate IR transmission, try to send a file with IR
Measure Tx Data from IR module with oscilloscope
OK
Measure Rx Data from IR module with oscilloscope
OK
Go to Application processor troubleshooting
No traffic
No traffic
Go to Application processor troubleshooting
Change IR module

WLAN interface troubleshooting

Troubleshooting flow


WLAN Failure
Read WLAN MAC Address (Phoenix)
ID reading works?
YES
WLAN module or WLAN RF failure
NO
VIO_APE within limits? J6420 (1.8V)
NO
Go to APE power checking troubleshooting
YES
Other supply voltages within limits? C6301 (1.5V), C6304 (3.6V), C6306 (2.8V)
NO
Check power lines and related components (regulators)
YES
Measure WLAN REF CLK = 38.4 MHz? C6302
NO
Check Clk line and related components (clock buffer)
Clk ok?
NO
Go to WLAN RF troubleshooting
YES
Read WLAN module ID (Phoenix)
ID reading works?
NO
YES
Replace WLAN module N6302
Read WLAN module ID (Phoenix)
ID reading works?
NO
Go to Application processor troubleshooting
YES
WLAN works?
NO
WLAN module or WLAN RF failure
WLAN works?
YES
END

Keyboard troubleshooting

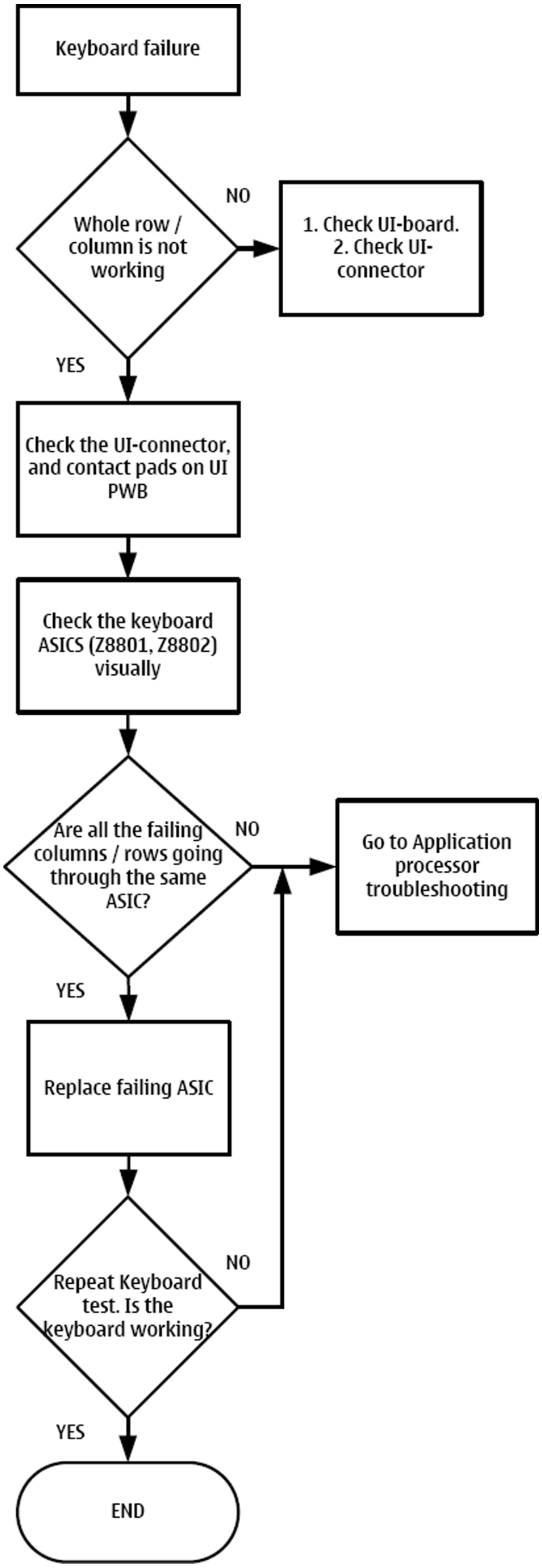
Context

There are two possible failure modes in the keyboard module:

1. One or more keys are stuck, so that the key(s) does not react when you press a keydome. This kind of failure is caused by mechanical reasons (dirt, corrosion).
2. Malfunction of several keys at the same time; this happens when one or more rows or columns are failing (shortcut or open connection). For a more detailed description of the keyboard and keymatrix, see section **Keyboard**.

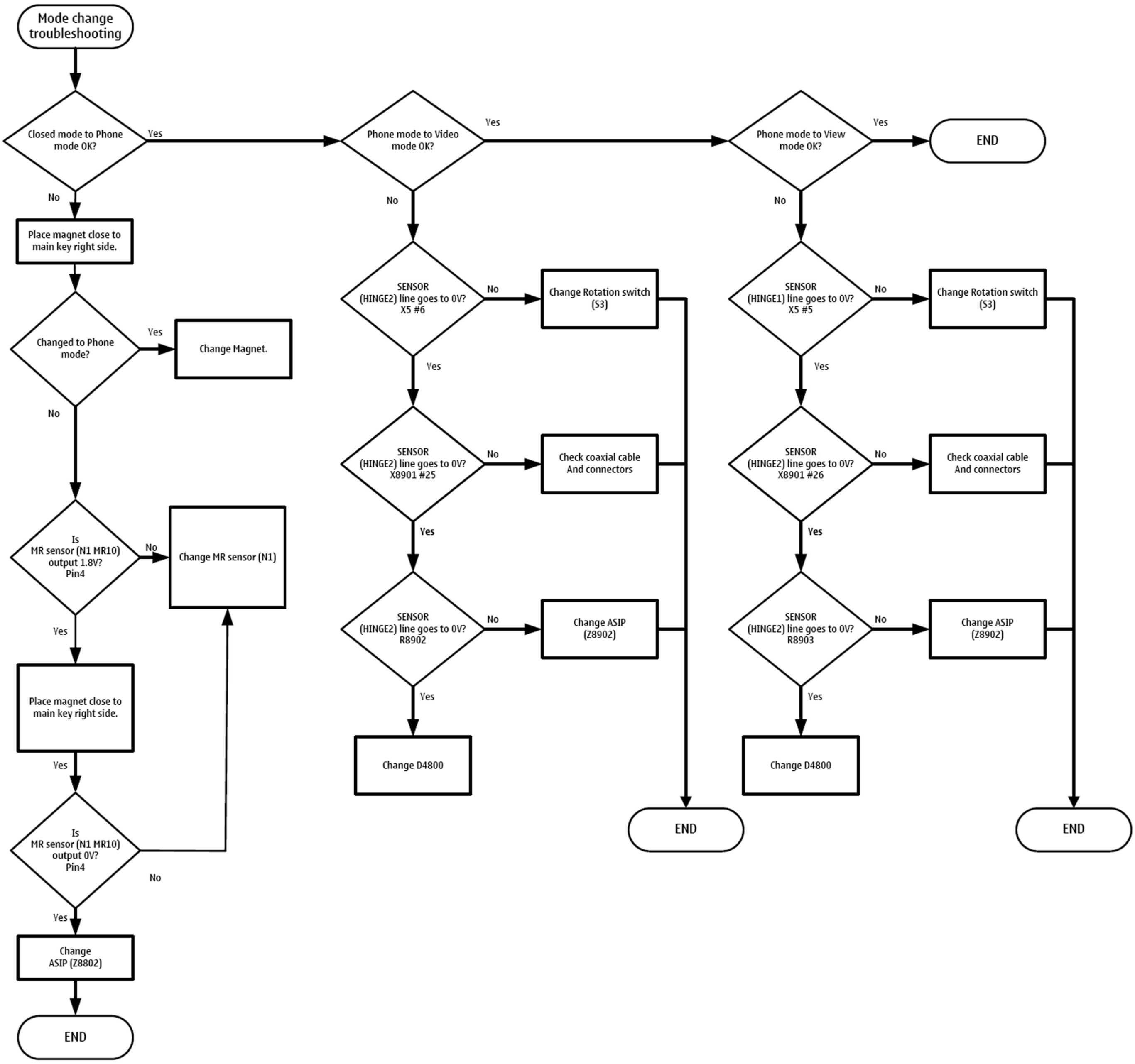
If the failure mode is not clear, start with the **Keyboard Test** in *Phoenix*.

Troubleshooting flow


Keyboard failure
Whole row / column is not working
NO
1. Check UI-board. 2. Check UI-connector
YES
Check the UI-connector, and contact pads on UI PWB
Check the keyboard ASICS (Z8801, Z8802) visually
Are all the failing columns / rows going through the same ASIC?
NO
Go to Application processor troubleshooting
YES
Replace failing ASIC
Repeat Keyboard test. Is the keyboard working?
NO
YES
END

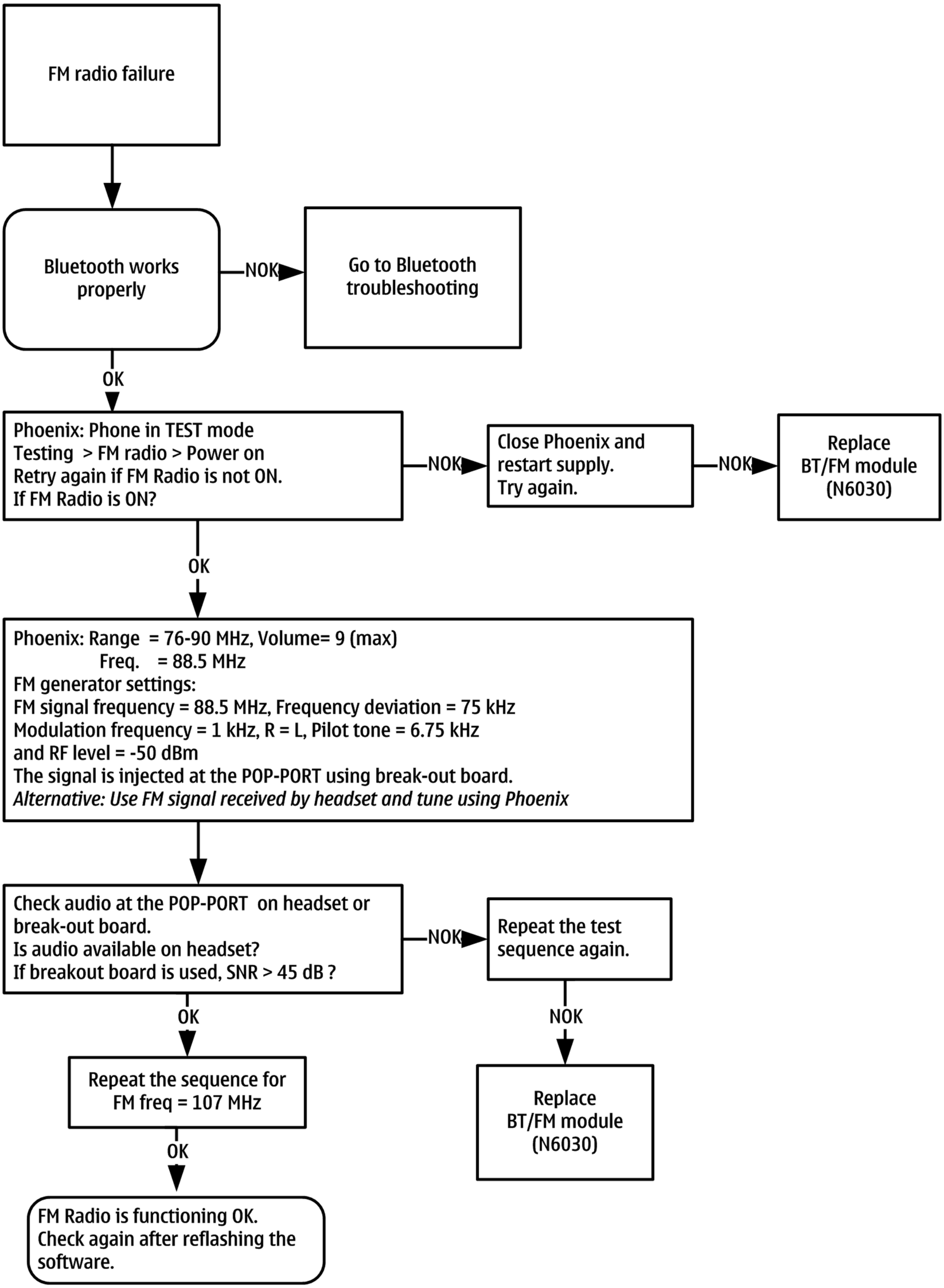
Mode switch troubleshooting

Troubleshooting flow


Mode change troubleshooting
Closed mode to Phone mode OK?
Yes
No
Place magnet close to main key right side.
Changed to Phone mode?
Yes
Change Magnet.
No
Is MR sensor (N1 MR10) output 1.8V? Pin4
No
Change MR sensor (N1)
Yes
Place magnet close to main key right side.
Yes
Is MR sensor (N1 MR10) output 0V? Pin4
No
Yes
Change ASIP (Z8802)
END
Phone mode to Video mode OK?
Yes
No
SENSOR (HINGE2) line goes to 0V? X5 #6
No
Change Rotation switch (S3)
Yes
SENSOR (HINGE2) line goes to 0V? X8901 #25
No
Check coaxial cable And connectors
Yes
SENSOR (HINGE2) line goes to 0V? R8902
No
Change ASIP (Z8902)
Yes
Change D4800
END
Phone mode to View mode OK?
Yes
END
No
SENSOR (HINGE1) line goes to 0V? X5 #5
No
Change Rotation switch (S3)
Yes
SENSOR (HINGE2) line goes to 0V? X8901 #26
No
Check coaxial cable And connectors
Yes
SENSOR (HINGE2) line goes to 0V? R8903
No
Change ASIP (Z8902)
Yes
Change D4800
END

FM radio troubleshooting

Troubleshooting flow


FM radio failure
Bluetooth works properly
NOK
Go to Bluetooth troubleshooting
OK
Phoenix: Phone in TEST mode
Testing > FM radio > Power on
Retry again if FM Radio is not ON.
If FM Radio is ON?
NOK
Close Phoenix and restart supply.
Try again.
NOK
Replace BT/FM module (N6030)
OK
Phoenix: Range = 76-90 MHz, Volume= 9 (max)
Freq. = 88.5 MHz
FM generator settings:
FM signal frequency = 88.5 MHz, Frequency deviation = 75 kHz
Modulation frequency = 1 kHz, R = L, Pilot tone = 6.75 kHz
and RF level = -50 dBm
The signal is injected at the POP-PORT using break-out board.
Alternative: Use FM signal received by headset and tune using Phoenix
Check audio at the POP-PORT on headset or break-out board.
Is audio available on headset?
If breakout board is used, SNR > 45 dB ?
NOK
Repeat the test sequence again.
NOK
Replace BT/FM module (N6030)
OK
Repeat the sequence for FM freq = 107 MHz
OK
FM Radio is functioning OK.
Check again after reflashing the software.

Certificate restoring for BB5.0 products

Context

This procedure is performed when the device certificate is corrupted for some reason.

All tunings (RF & Baseband, UI) must be done after performing the certificate restoring procedure.

The procedure for certificate restoring is the following:

- Flash the phone with the latest available software using FPS-8 or FPS-10.

  Note: USB flashing does not work for a dead BB5.0 phone.
- Create a request file.
- Send the file to Nokia by e-mail. Use the following addresses depending on your location:
  - APAC: sydney.service@nokia.com
  - CHINA: repair.ams@nokia.com
  - E&A: salo.repair@nokia.com
  - AMERICAS: fls1.usa@nokia.com
- When you receive a reply from Nokia, carry out certificate restoring.
- Tune the phone completely.

  Note: SX-4 smart card is needed.
- If the phone resets after certificate restoring, reflash the phone again.

Required equipment and setup:

- *Phoenix* service software v 2004.39.7.70 or newer.
- The latest phone model specific *Phoenix* data package.
- PKD-1 dongle
- SX-4 smart card (Enables BB5.0 testing and tuning features)
- External smart card reader

  Note: The smart card reader is only needed when FPS-8 is used. FPS-10 has an integrated smart card reader.
- Activated FPS-8 flash prommer **OR** FPS-10 flash prommer
- Flash update package 03.18.004 or newer for FPS-8 or FPS-10 flash prommers
- CU-4 control unit
- USB cable from PC USB Port to CU-4 control unit
- Phone model specific adapter for CU-4 control unit
- PCS-1 cable to power CU-4 from external power supply
- XCS-4 modular cable between flash prommer and CU-4

  Note: CU-4 must be supplied with +12 V from an external power supply in all steps of certificate restoring.

Steps

1. Program the phone software.

   i Start *Phoenix* and login. Make sure the connection has been managed correctly for FPS-8 or FPS-10.

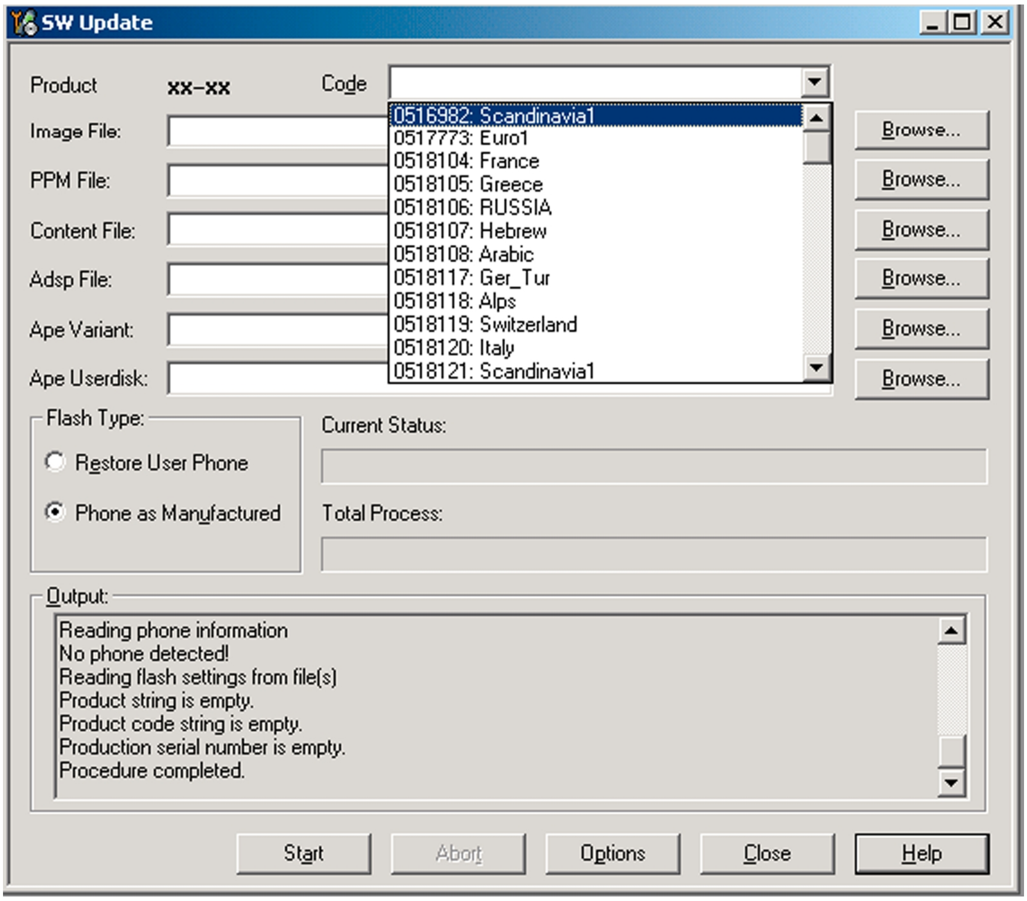
   ii Update the phone MCU software to the latest available version.

   If the new flash is empty and the phone cannot communicate with *Phoenix*, reflash the phone.

iii Choose the product manually from **File→Open Product** , and click **OK**.

Wait for the phone type designator (e.g. “RM-1”) to be displayed in the status bar.

iv Go to **Flashing→SW Update** and wait until *Phoenix* reads the product data as shown in the following picture.


SW Update
Code
0516982: Scandinavia1
0517773: Euro1
0518104: France
0518105: Greece
0518106: RUSSIA
0518107: Hebrew
0518108: Arabic
0518117: Ger_Tur
0518118: Alps
0518119: Switzerland
0518120: Italy
0518121: Scandinavia1
Image File:
PPM File:
Content File:
Adsp File:
Ape Variant:
Ape Userdisk:
Browse...
Browse...
Browse...
Browse...
Browse...
Browse...
Flash Type:
○ Restore User Phone
Current Status:
Total Process:
Output:
Start
Abort
Options
Close
Help

Product xx-xx

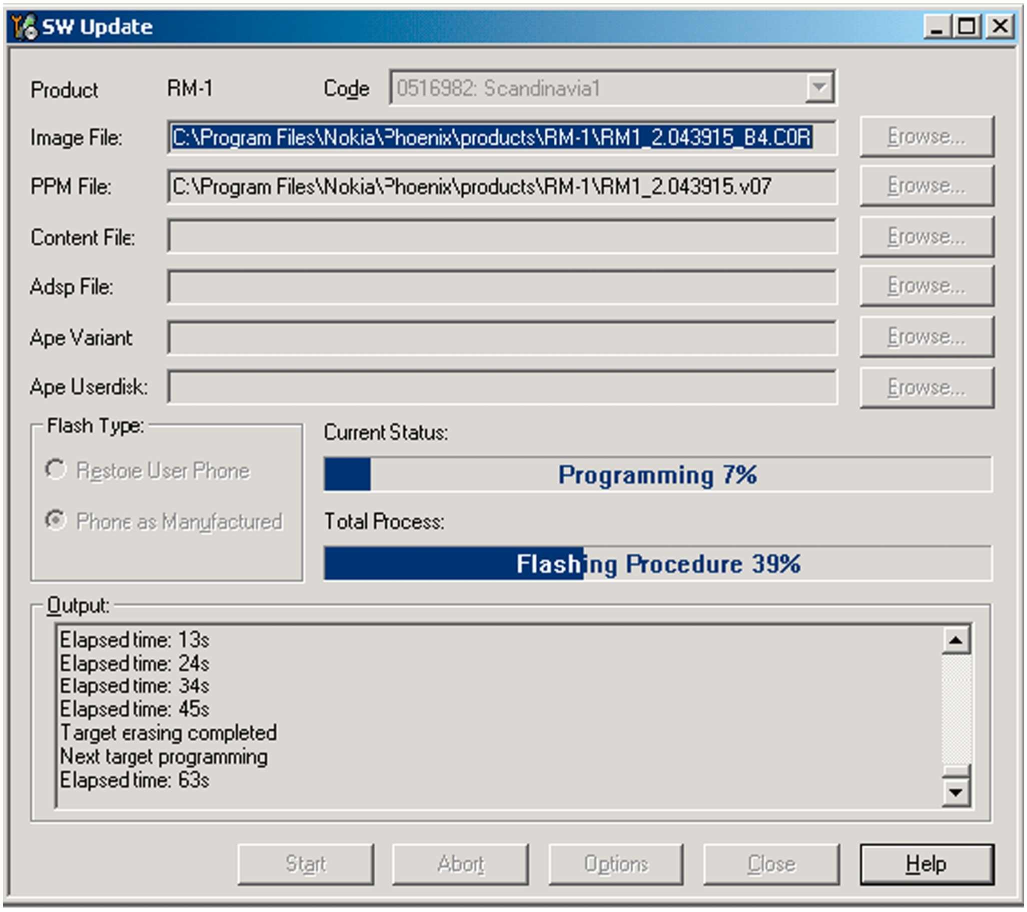
Flash Type: ● Phone as Manufactured

```
Reading phone information
No phone detected!
Reading flash settings from file(s)
Product string is empty.
Product code string is empty.
Production serial number is empty.
Procedure completed.
```

Product	is automatically set according to the phone support module which was opened manually, but the flash files cannot be found because the correct data cannot be read from the phone automatically.
Code	must be chosen manually, it determines the correct flash files to be used. Please choose the correct product code (can be seen in the phone type label) from the dropdown list.
Flash Type	must be set to **Phone as Manufactured**.

v To continue, click **Start**.

Progress bars and messages on the screen show actions during phone programming, please wait.


SW Update
Browse...
Browse...
Browse...
Browse...
Browse...
Browse...
Content File:
Adsp File:
Ape Variant
Ape Userdisk:
Flash Type:
○ Restore User Phone
Current Status:
Total Process:
Output:
Start
Abort
Options
Close
Help

Product RM-1

Code 0516982: Scandinavia1

Image File: C:\Program Files\Nokia\Phoenix\products\RM-1\RM1_2.043915_B4.C0R

PPM File: C:\Program Files\Nokia\Phoenix\products\RM-1\RM1_2.043915.v07

● Phone as Manufactured

Programming 7%

Flashing Procedure 39%

```
Elapsed time: 13s
Elapsed time: 24s
Elapsed time: 34s
Elapsed time: 45s
Target erasing completed
Next target programming
Elapsed time: 63s
```

Programming is completed when *Flashing Completed* message is displayed.

The product type designator and MCU SW version are displayed in the status bar.

vi Close the *SW Update* window and then choose **File→Close Product** .

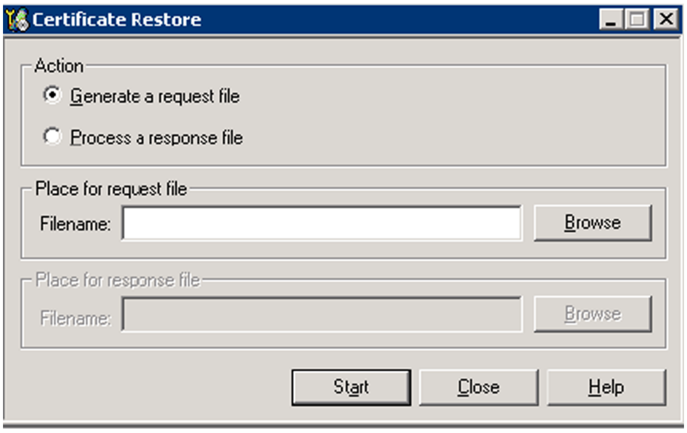
2. Create a *Request* file.

For this procedure, you must supply +12 V to CU-4 from an external power supply.

i To connect the phone with *Phoenix*, choose **File→Scan Product** .

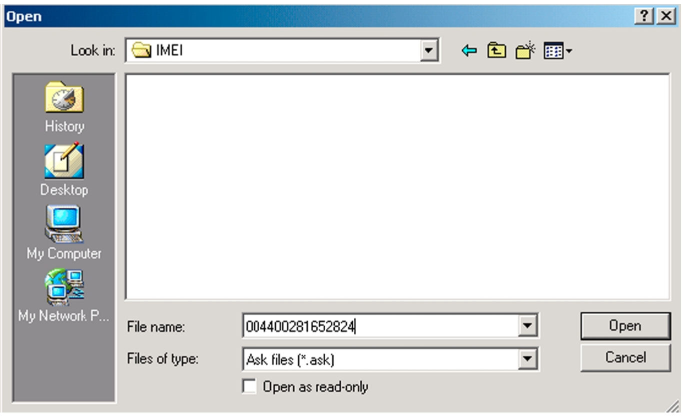
ii Choose **Tools→Certificate Restore** .

iii To choose a location for the request file, click **Browse**.


Certificate Restore
Action
○ Process a response file
Place for request file
Filename:
Browse
Place for response file
Filename:
Browse
Start
Close
Help

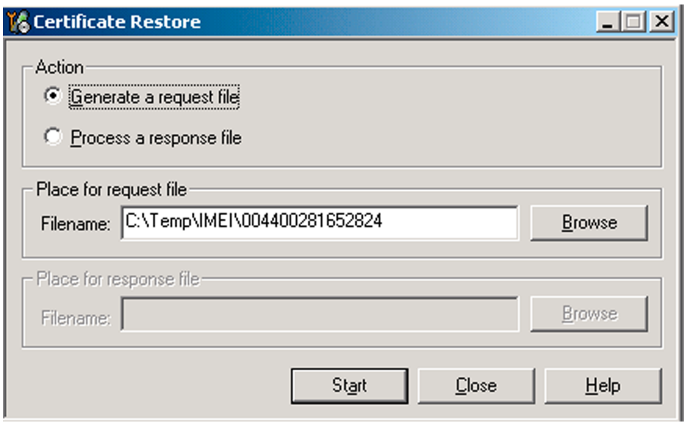
● Generate a request file

iv Name the file so that you can easily identify it, and click **Open**.


Open
History
Desktop
My Computer
My Network P...
Open
Cancel

Look in: IMEI
File name: 004400281652824
Files of type: Ask files (*.ask)
☐ Open as read-only

The name of the file and its location are shown.


Certificate Restore
Browse
Browse
Start
Close
Help

Action
● Generate a request file
○ Process a response file

Place for request file
Filename: C:\Temp\IMEI\004400281652824

Place for response file
Filename:

v To create the *Request* file, click **Start**.

vi When the file for certificate restore has been created, send it to Nokia as an e-mail attachment.

3. Restore certificate.

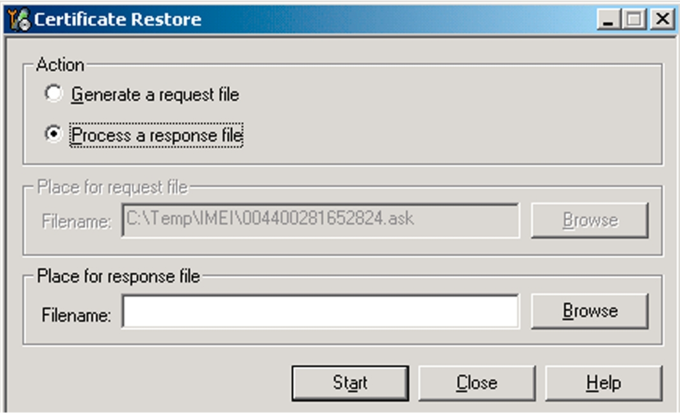
   For this procedure, you must supply +12 V to CU-4 from an external power supply.

   i Save the reply file sent by Nokia to your computer.

   ii Start *Phoenix* service software.

   iii Choose **File→Scan Product** .

iv From the **Tools** menu, choose **Certificate Restore** and select **Process a response file** in the *Action* pane.


Certificate Restore
Action
Place for request file
Browse
Place for response file
Browse
Start
Close
Help

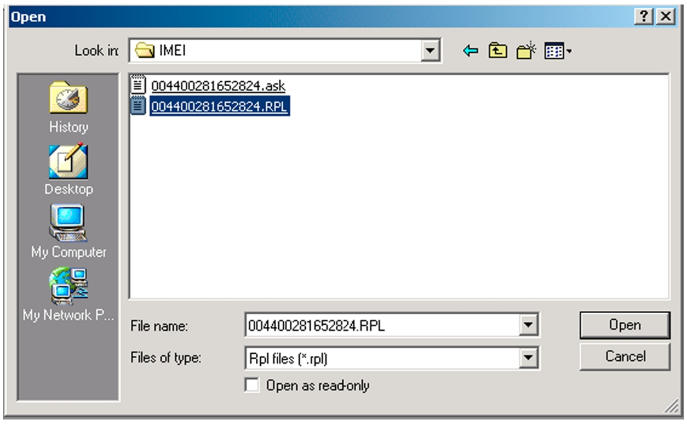
○ Generate a request file
● Process a response file

Filename: C:\Temp\IMEI\004400281652824.ask

Filename:

v To choose the location where response file is saved, click **Browse**.

vi Click **Open**.


Open
History
Desktop
My Computer
My Network P...
Open
Cancel

Look in: IMEI

004400281652824.ask
004400281652824.RPL

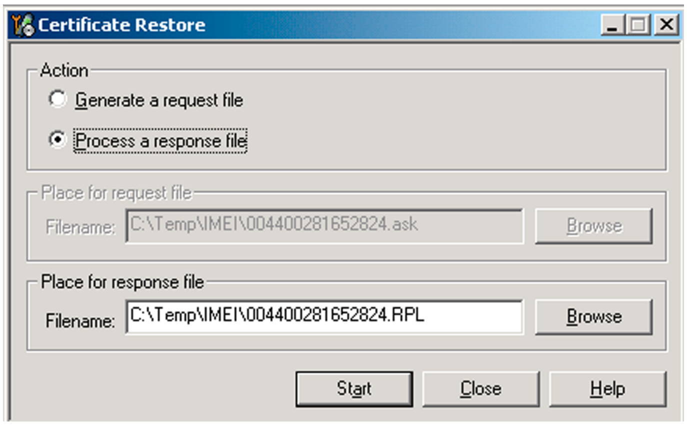
File name: 004400281652824.RPL

Files of type: Rpl files (*.rpl)

☐ Open as read-only

The name of the file and the path where it is located are shown.

vii To write the file to phone, click **Start**.


Certificate Restore
Action
Place for request file
Browse
Place for response file
Browse
Start
Close
Help

○ Generate a request file
● Process a response file

Filename: C:\Temp\IMEI\004400281652824.ask

Filename: C:\Temp\IMEI\004400281652824.RPL

Next actions

After a successful rewrite, you must retune the phone completely by using *Phoenix* tuning functions.

Important: Perform all tunings: RF, BB, and UI.

Display module troubleshooting

General instructions for display troubleshooting

Context

- The display is in a normal mode when the phone is in active use.
- Display is in a partial idle mode when the phone is in the screen saver mode.
- The operating modes of the display can be controlled with the help of *Phoenix*.

Table 11 Display module troubleshooting cases

Display blank	There is no image on the display. The display looks the same when the phone is on as it does when the phone is off. The backlight can be on in some cases.
Image on the display not correct	Image on the display can be corrupted or a part of the image can be missing. If a part of the image is missing, change the display module. If the image is otherwise corrupted, follow the appropriate troubleshooting diagram.
Backlight dim or not working at all	Backlight LED components are inside the display module. Backlight failure can also be in the connector or in the backlight power source in the main engine of the phone. This means that in case the display is working (image OK), the backlight is faulty.
Visual defects (pixel)	Pixel defects can be checked by controlling the display with Phoenix. Use both colours, black and white, on a full screen. The display may have some random pixel defects that are acceptable for this type of display. The criteria when pixel defects are regarded as a display failure, resulting in a replacement of the display, are presented the following table.

Table 12 Pixel defects

Item		White dot defect				Black dot defect	Total
1	Defect counts	R	G	B	White Dot Total	1	1
		1	1	1	1		
2	Combined defect counts	Not allowed. Two single dot defects that are within 5 mm of each other should be interpreted as combined dot defect.					

Steps

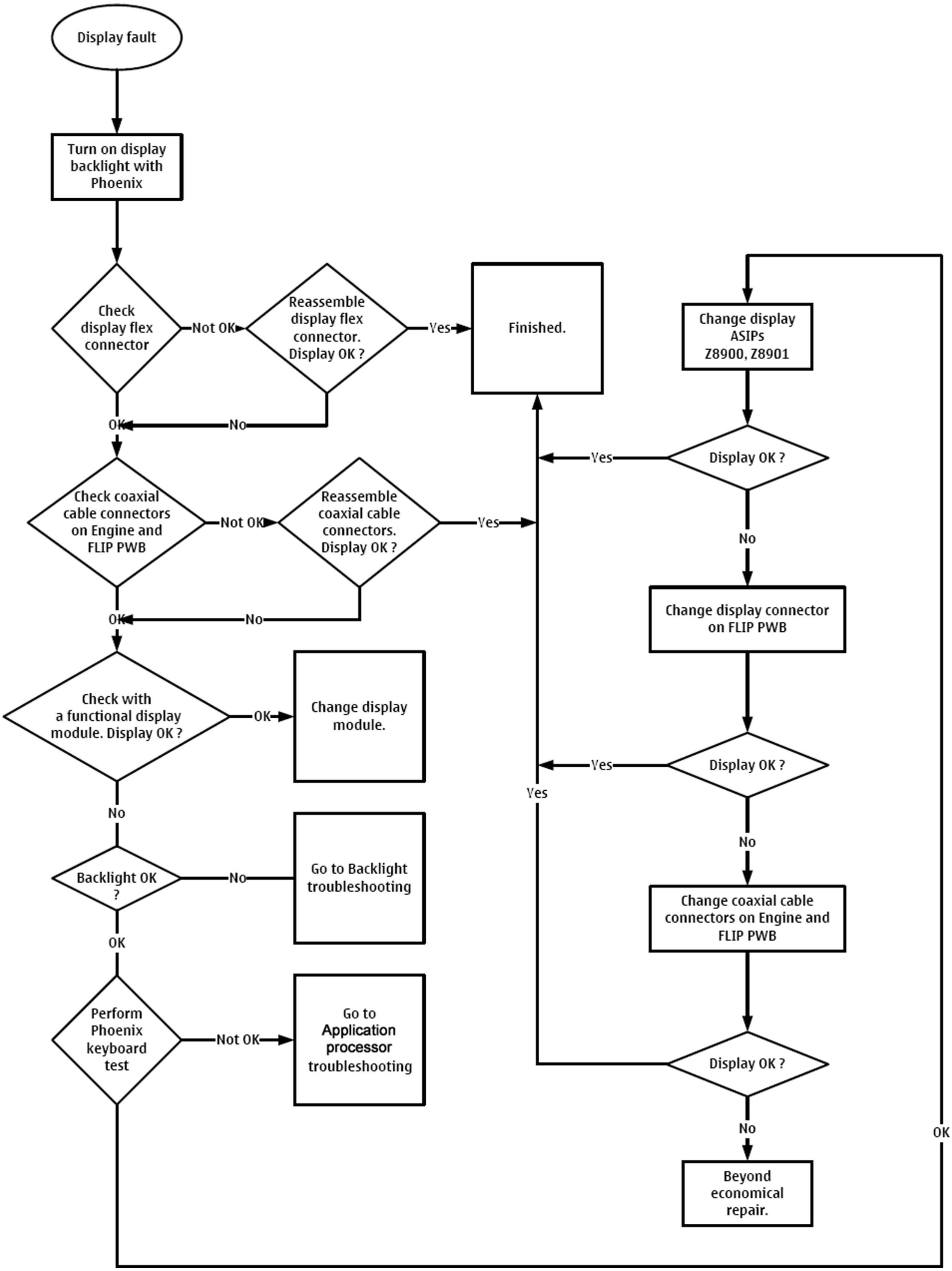
1. Verify with a working display that the fault is not on the display module itself.

   The display module cannot be repaired.
2. Check that the cellular engine is working normally.
   - i To check the functionality, connect the phone to a docking station.
   - ii Start *Phoenix* service software.
   - iii Read the phone information to check that also the application engine is functioning normally (you should be able to read the APE ID).
3. Proceed to the display troubleshooting flowcharts.

   Use the **Display Test** tool in *Phoenix* to find the detailed fault mode.

Main display troubleshooting

Troubleshooting flow


Display fault
Turn on display backlight with Phoenix
Check display flex connector
Not OK
Reassemble display flex connector. Display OK ?
Yes
Finished.
No
OK
Check coaxial cable connectors on Engine and FLIP PWB
Not OK
Reassemble coaxial cable connectors. Display OK ?
Yes
No
OK
Check with a functional display module. Display OK ?
OK
Change display module.
No
Backlight OK ?
No
Go to Backlight troubleshooting
OK
Perform Phoenix keyboard test
Not OK
Go to Application processor troubleshooting
Change display ASIPs Z8900, Z8901
Display OK ?
Yes
No
Change display connector on FLIP PWB
Display OK ?
Yes
No
Change coaxial cable connectors on Engine and FLIP PWB
Display OK ?
Yes
No
Beyond economical repair.
OK

Display and keyboard backlight troubleshooting

Context

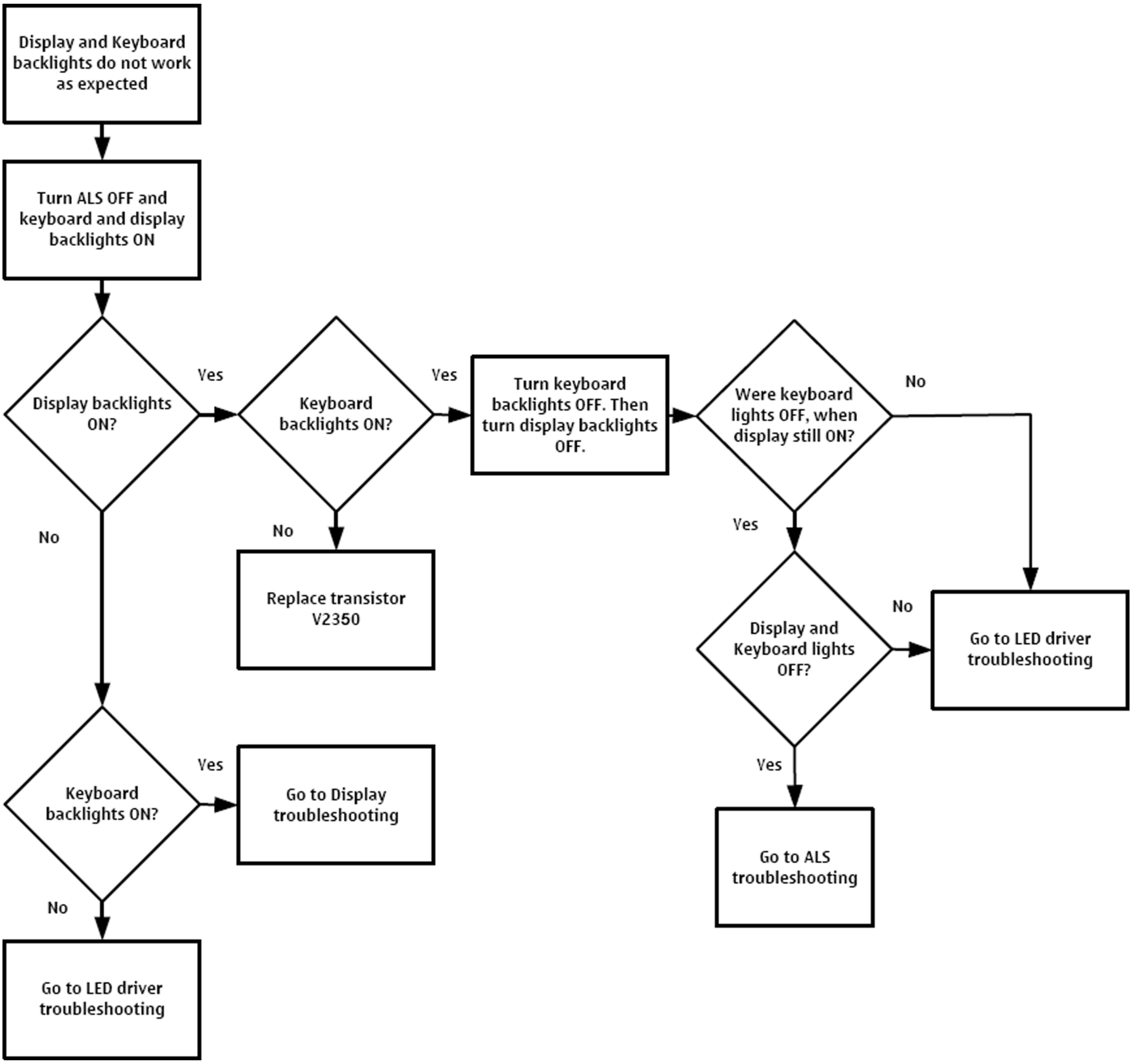
The device has one LED driver that provides current for both display and keyboard backlights.

Keyboard backlights are turned ON only in dark conditions. This is controlled by the Ambient Light Sensor (ALS). Also the brightness of the display is adjusted by the ambient light sensor.

You can enable/disable ALS with the help of Phoenix service software.

Display brightness can be adjusted manually, if ALS is disabled. If the ambient light sensor is enabled, it adjusts the display brightness automatically.

Troubleshooting flow


Display and Keyboard backlights do not work as expected
Turn ALS OFF and keyboard and display backlights ON
Display backlights ON?
Yes
No
Keyboard backlights ON?
Yes
No
Replace transistor V2350
Turn keyboard backlights OFF. Then turn display backlights OFF.
Were keyboard lights OFF, when display still ON?
No
Yes
Display and Keyboard lights OFF?
No
Yes
Go to LED driver troubleshooting
Go to ALS troubleshooting
Keyboard backlights ON?
Yes
No
Go to Display troubleshooting
Go to LED driver troubleshooting

ALS troubleshooting

Context

- If a phototransistor is broken, replace it with a typical phototransistor.
- After replacing the phototransistor or if calibration values are lost for some other reason, ALS re-tuning is required.
- Before starting the ALS calibration procedure, perform the 'Pull-up resistor calibration' in dark lighting conditions, and write the measured 'correction' value to the phone. After this ALS calibration procedure is performed, and the default co-efficient value '1' is written to the phone.
- Make sure that you have completed **Display and keypad backlight troubleshooting** first before starting **ALS troubleshooting**.

Here are some hints for ALS troubleshooting; the following troubleshooting diagram refers to these:

- *Phoenix* LED control tool also shows you luminance. The correct luminance in darkness is <20 lx, and in office environment 100-2000 lx. The luminance value depends strongly on the light source and the angle of the phone, so these values are only a rough guideline.
- LED driver control voltage measurement points can be found from the **LED driver troubleshooting** section. When backlight brightness is set to 100%, both GENOUT signals are low, and enable PWM is 100%.
- *Phoenix* has an ambient light sensor calibration tool for changing calibration values. The pull-up resistor calibration is done first. See the following procedure.

Steps

1. Cover the light guide (upper part of the A-Cover).
2. Start *Phoenix*.
3. Choose **File→Scan Product.**

4. Choose **Tuning→Ambient Light Sensor Calibration.**

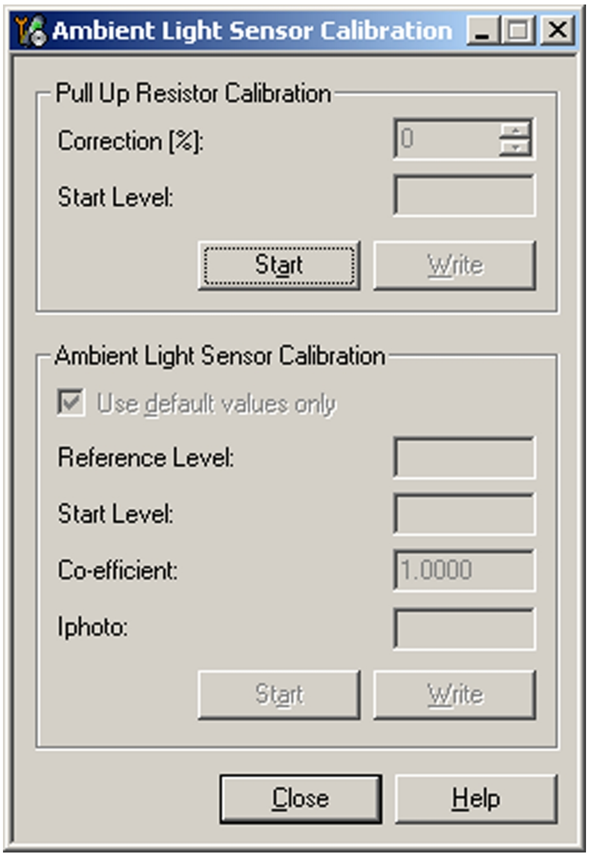
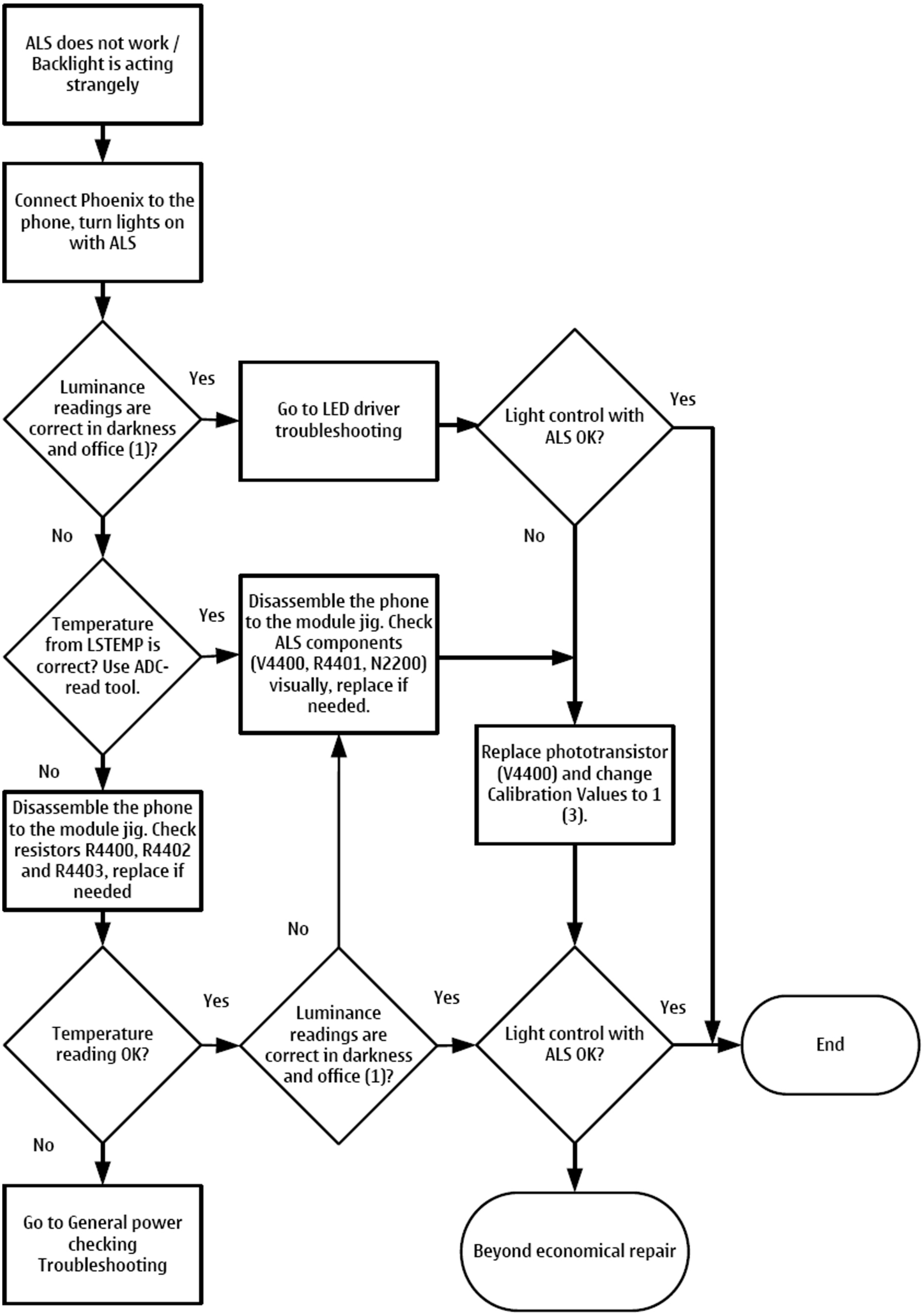

Ambient Light Sensor Calibration
Pull Up Resistor Calibration
Correction [%]:
0
Start Level:
Start
Write
Ambient Light Sensor Calibration
☑ Use default values only
Reference Level:
Start Level:
Co-efficient:
1.0000
Iphoto:
Start
Write
Close
Help

Figure 39 ***Ambient Light Sensor Calibration*** **window**

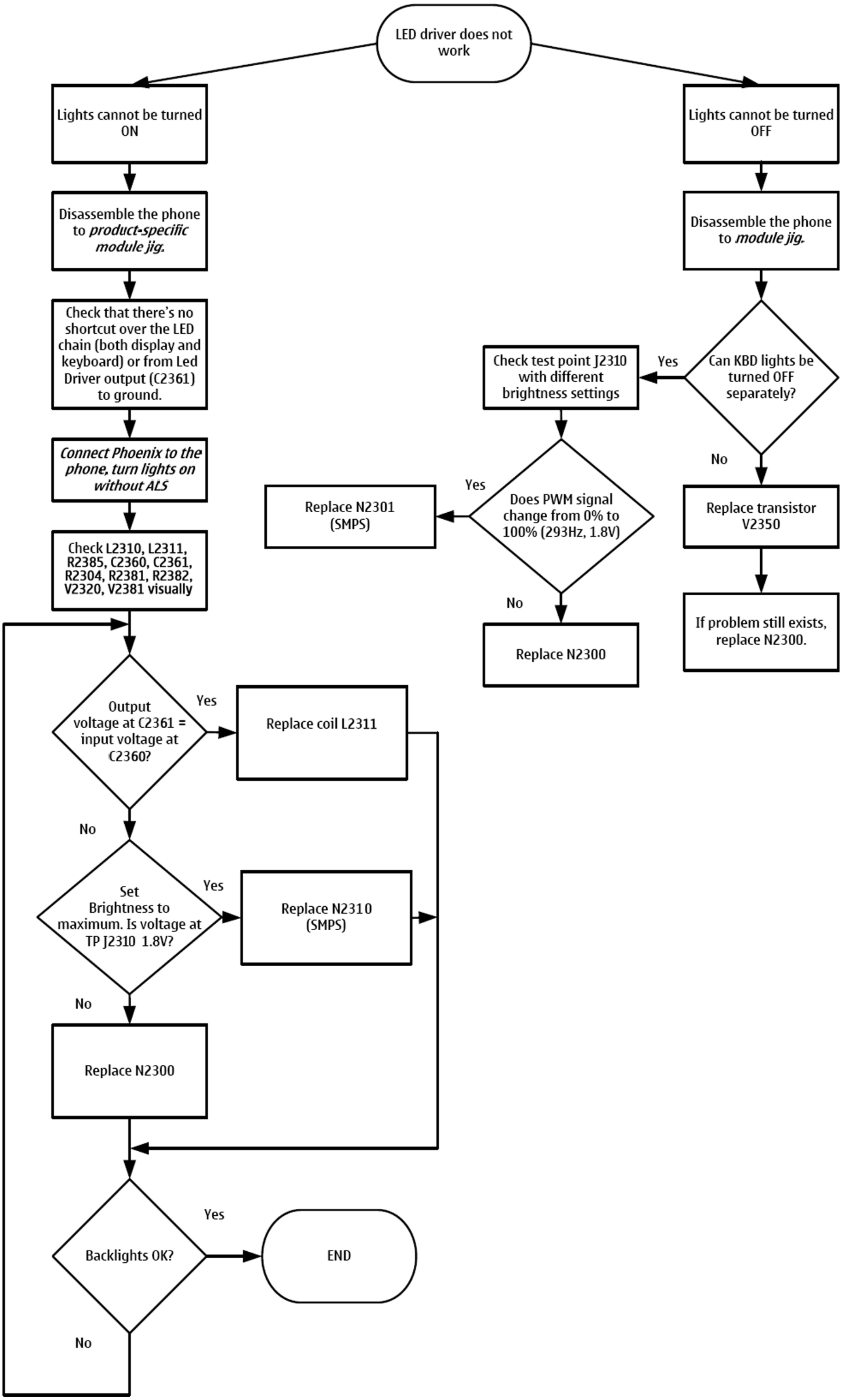
5. In the *Pull Up Resistor Calibration* pane, click **Start**, and **Write**.
6. In the *Ambient Light Sensor Calibration* pane, check the **Use default values only** check box, and click **Write**.
7. To end the calibration, click **Close**.

Troubleshooting flow


ALS does not work / Backlight is acting strangely
Connect Phoenix to the phone, turn lights on with ALS
Luminance readings are correct in darkness and office (1)?
Yes
Go to LED driver troubleshooting
Light control with ALS OK?
Yes
No
No
Temperature from LSTEMP is correct? Use ADC-read tool.
Yes
Disassemble the phone to the module jig. Check ALS components (V4400, R4401, N2200) visually, replace if needed.
No
Disassemble the phone to the module jig. Check resistors R4400, R4402 and R4403, replace if needed
Replace phototransistor (V4400) and change Calibration Values to 1 (3).
No
Temperature reading OK?
Yes
Luminance readings are correct in darkness and office (1)?
Yes
Light control with ALS OK?
Yes
End
No
Go to General power checking Troubleshooting
Beyond economical repair

LED driver troubleshooting

Troubleshooting flow


LED driver does not work
Lights cannot be turned ON
Disassemble the phone to *product-specific module jig.*
Check that there's no shortcut over the LED chain (both display and keyboard) or from Led Driver output (C2361) to ground.
Connect Phoenix to the phone, turn lights on without ALS
Check L2310, L2311, R2385, C2360, C2361, R2304, R2381, R2382, V2320, V2381 visually
Output voltage at C2361 = input voltage at C2360?
Yes
Replace coil L2311
No
Set Brightness to maximum. Is voltage at TP J2310 1.8V?
Yes
Replace N2310 (SMPS)
No
Replace N2300
Backlights OK?
Yes
END
No
Lights cannot be turned OFF
Disassemble the phone to *module jig.*
Can KBD lights be turned OFF separately?
Yes
Check test point J2310 with different brightness settings
Does PWM signal change from 0% to 100% (293Hz, 1.8V)
Yes
Replace N2301 (SMPS)
No
Replace N2300
No
Replace transistor V2350
If problem still exists, replace N2300.

Adjusting LCD and keyboard backlights in Phoenix

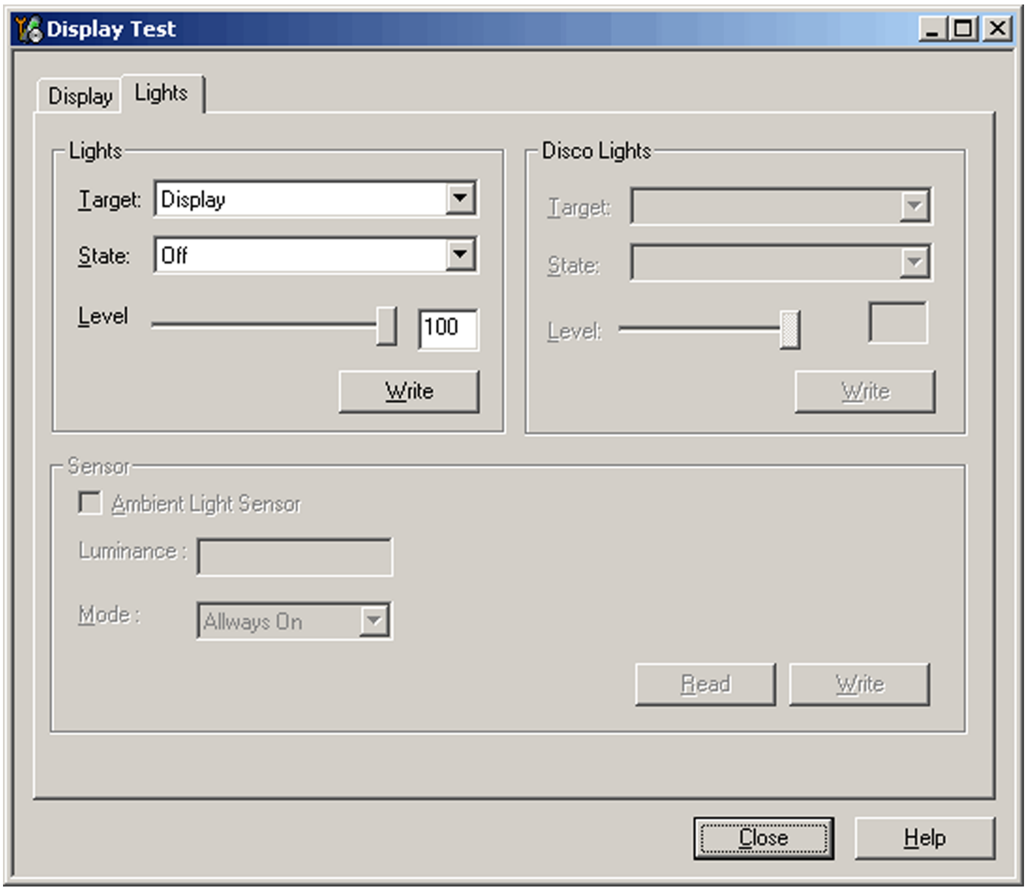
Context

- The main LCD and sub LCD backlights do not turn on at the same time because of hardware limitations.
- The keyboard backlights can be turned on only when the main LCD backlight is on. You cannot turn on the keyboard backlights when the sub LCD backlight is on or the main LCD backlight is off.
- The brightness level of the keyboard backlights follow the brightness of the main LCD backlight.
- It takes 30 seconds to change the LCD backlight on/off status after clicking the **Write** button. If you need to turn on/off the backlight quickly, use the **Level** field to turn on (100%)/off (0%) the backlight.

Steps

1. Open *Phoenix* service software.
2. Choose **File→Scan Product.**
3. Choose **Testing→Display Test.**

   Display Test window appears.



Target: Display
State: Off
Level: 100
Mode: Allways On

Display Test
Display
Lights
Lights
Disco Lights
Target:
State:
Level:
Write
Sensor
☐ Ambient Light Sensor
Luminance :
Read
Write
Close
Help

4. To access the light control menu, click the **Lights** tab.
5. From the **Target** drop-down menu, choose the test target: **Display**, **Display2**, **Keyboard**.

   Display = main display

   Display2 = sub display.

   You can also change the backlight status to **On** or **Off** from the **State** drop-down menu.

6. Click **Write**.

   The selected test target can now be controlled. You can control the brightness by using the **Level** slider.

Examples

1 To turn on/off the main LCD backlight, use the following settings:
  - Target: Display
  - State: On/Off
  - Level: 100

  You can turn the LCD backlight on/off by adjusting the **Level** value to be either **100** (On) and **0** (Off).

2 To turn on/off the sub LCD backlight, use the following settings:
  - Target: Display2
  - State: On/Off
  - Level: 100

  You can turn the sub LCD backlight on/off by adjusting the **Level** value to be either **100** (On) and **0** (Off).

3 To turn on/off the keyboard backlight, use the following settings:
  - Target: Keyboard
  - State: On/Off
  - Level: 100

    Note: The main LCD backlight has to be on in advance.

Bluetooth troubleshooting

Introduction to Bluetooth troubleshooting

There are two main Bluetooth problems that can occur:

Problem	Description
Detachment of the Bluetooth antenna.	This would most likely happen if the device has been dropped repeatedly to the ground. It could cause the Bluetooth antenna to become loose or partially detached from the PWB. (see the following pictures for details on BT antenna HW and mechanics)
Malfunction in the Bluetooth ASIC, BB ASICs or Phone's Bluetooth SMD (Surface Mounted Device) components.	This is unpredictable and could have many causes, i.e. SW or HW related.

The main issue is to find out if the problem is related to the BT antenna or related to the Bluetooth system or the phone's BB and then replace/fix the faulty component.

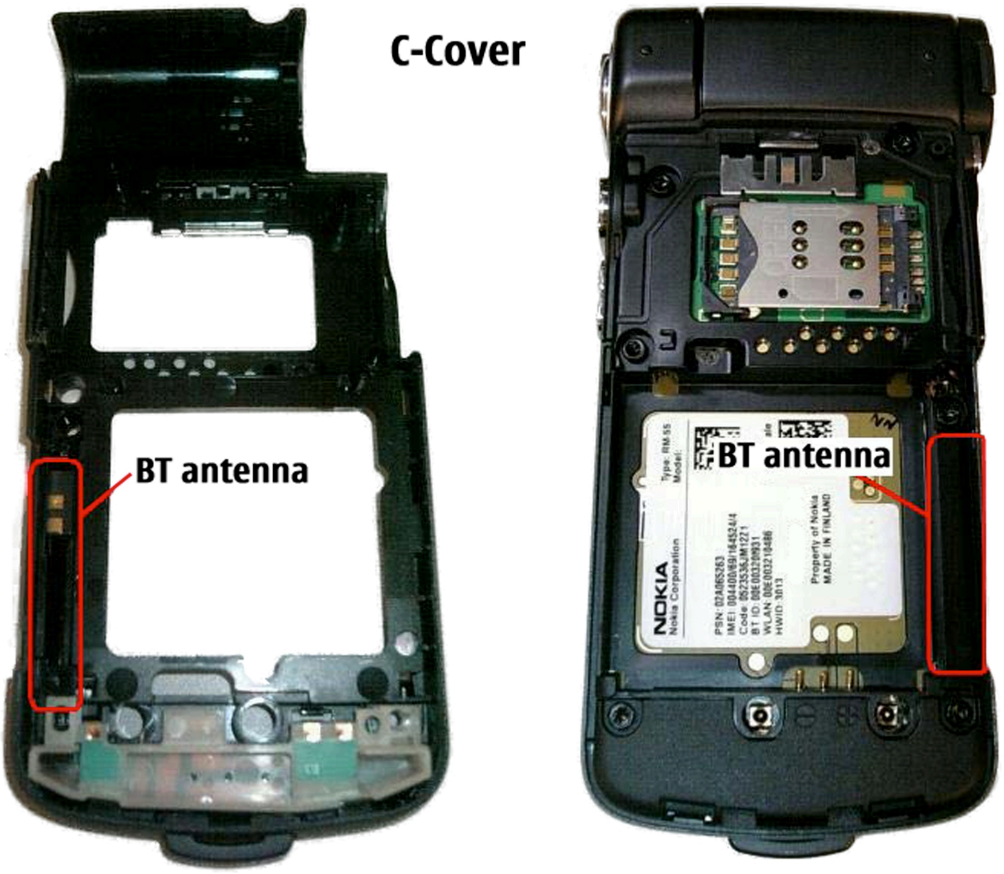

C-Cover
BT antenna
BT antenna

Figure 40 Bluetooth antenna location

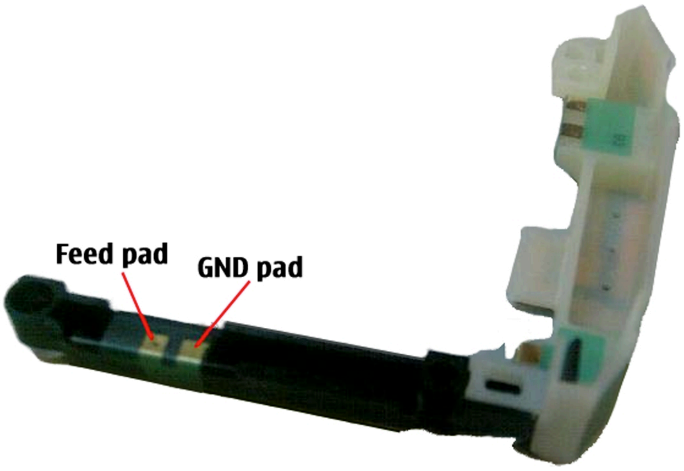

Feed pad
GND pad

Figure 41 Bluetooth antenna module

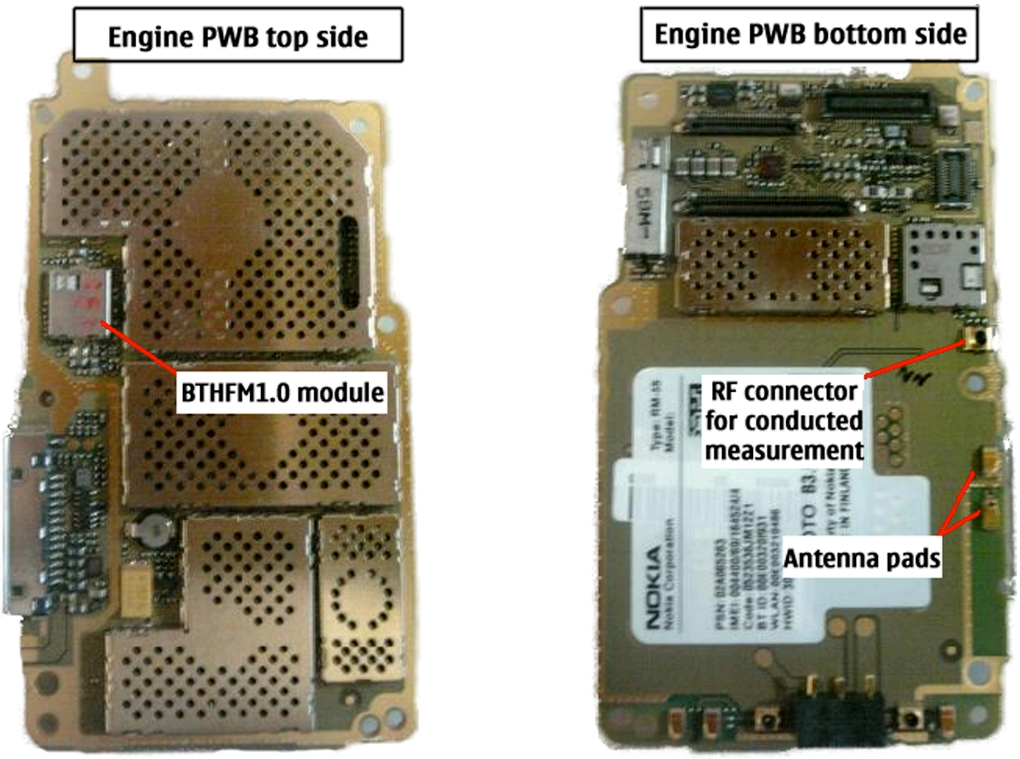

Engine PWB top side
BTHFM1.0 module
Engine PWB bottom side
RF connector for conducted measurement
Antenna pads

Figure 42 Bluetooth location on PWB

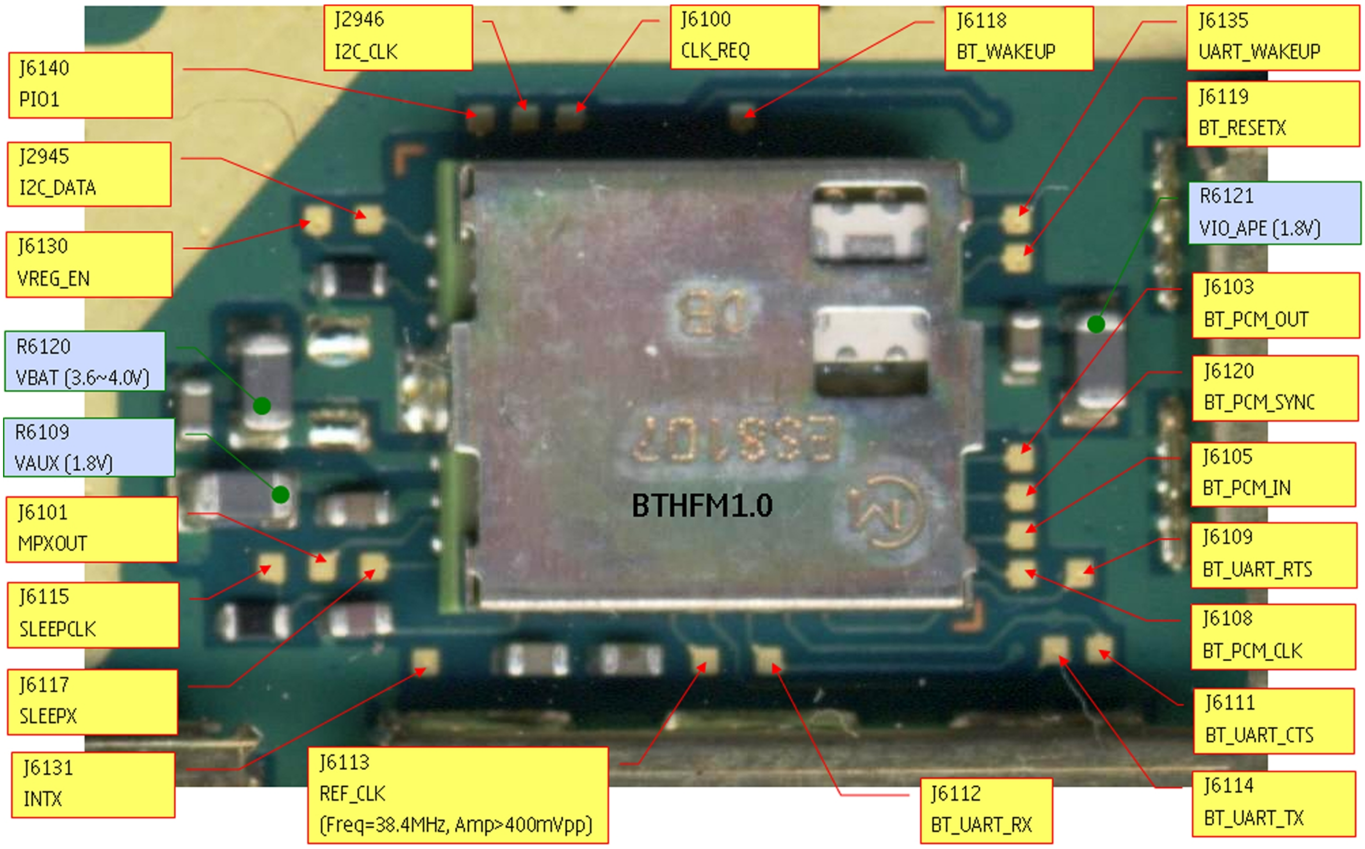

J6140
PIO1
J2946
I2C_CLK
J6100
CLK_REQ
J6118
BT_WAKEUP
J6135
UART_WAKEUP
J2945
I2C_DATA
J6119
BT_RESETX
J6130
VREG_EN
R6121
VIO_APE (1.8V)
J6103
BT_PCM_OUT
R6120
VBAT (3.6~4.0V)
J6120
BT_PCM_SYNC
R6109
VAUX (1.8V)
J6105
BT_PCM_IN
BTHFM1.0
J6101
MPXOUT
J6109
BT_UART_RTS
J6115
SLEEPCLK
J6108
BT_PCM_CLK
J6117
SLEEPX
J6111
BT_UART_CTS
J6131
INTX
J6113
REF_CLK
(Freq=38.4MHz, Amp>400mVpp)
J6112
BT_UART_RX
J6114
BT_UART_TX

Figure 43 Bluetooth circuitry and test points

Bluetooth settings for Phoenix

Steps

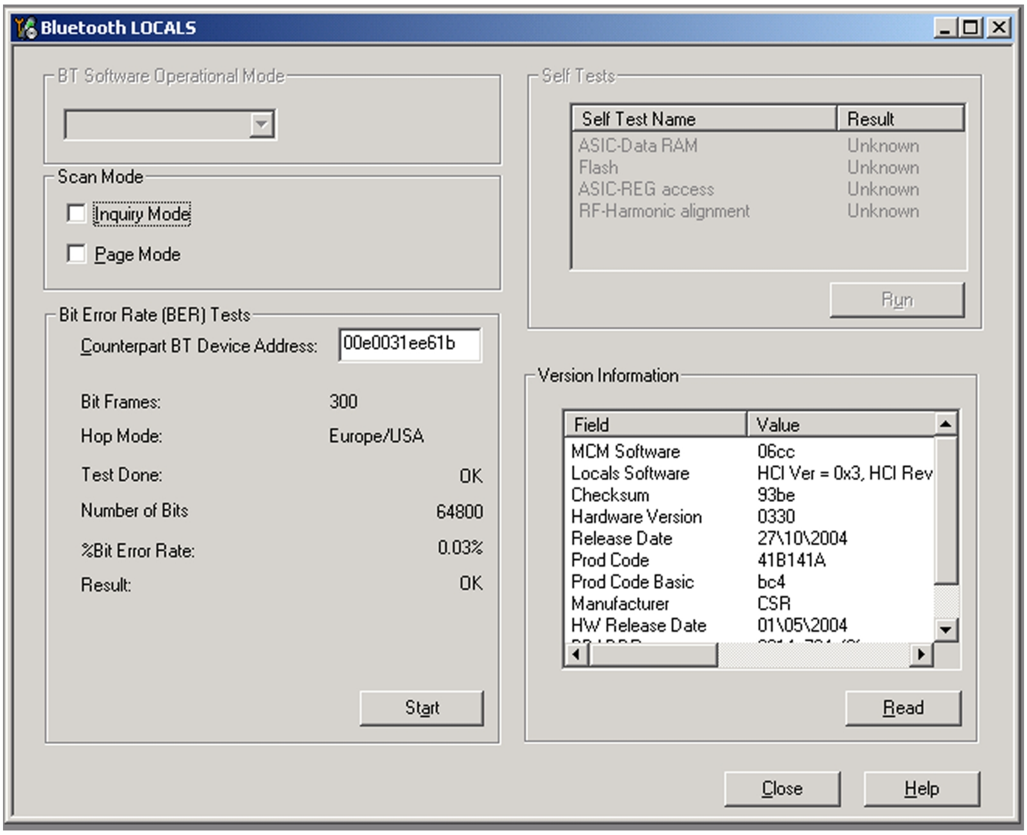
1. Start *Phoenix* service software.
2. From the **File** menu, choose **Open Product**, and then choose the correct type designator from the **Product** list.
3. Place the phone to a flash adapter in the local mode.
4. Choose **Testing→Bluetooth LOCALS** .
5. Locate JBT-9’s serial number (12 digits) found in the type label on the back of JBT-9.

   In addition to JBT-9, also SB-6, JBT-3 and JBT-6 Bluetooth test boxes can be used.
6. In the *Bluetooth LOCALS* window, write the 12-digit serial number on the **Counterpart BT Device Address** line.

   This needs to be done only once provided that JBT-9 is not changed.
7. Place the JBT-9 box near (within 10 cm) the BT antenna and click **Run BER Test**.

Results

Bit Error Rate test result is displayed in the *Bit Error Rate (BER) Tests* pane in the *Bluetooth LOCALS* window.


Bluetooth LOCALS
BT Software Operational Mode
Self Tests
Scan Mode
☐ Inquiry Mode
☐ Page Mode
Bit Error Rate (BER) Tests
Run
Version Information
Start
Read
Close
Help

Self Test Name	Result
ASIC-Data RAM	Unknown
Flash	Unknown
ASIC-REG access	Unknown
RF-Harmonic alignment	Unknown

Counterpart BT Device Address: 00e0031ee61b

Bit Frames:	300
Hop Mode:	Europe/USA
Test Done:	OK
Number of Bits	64800
%Bit Error Rate:	0.03%
Result:	OK

Field	Value
MCM Software	06cc
Locals Software	HCI Ver = 0x3, HCI Rev
Checksum	93be
Hardware Version	0330
Release Date	27\10\2004
Prod Code	41B141A
Prod Code Basic	bc4
Manufacturer	CSR
HW Release Date	01\05\2004

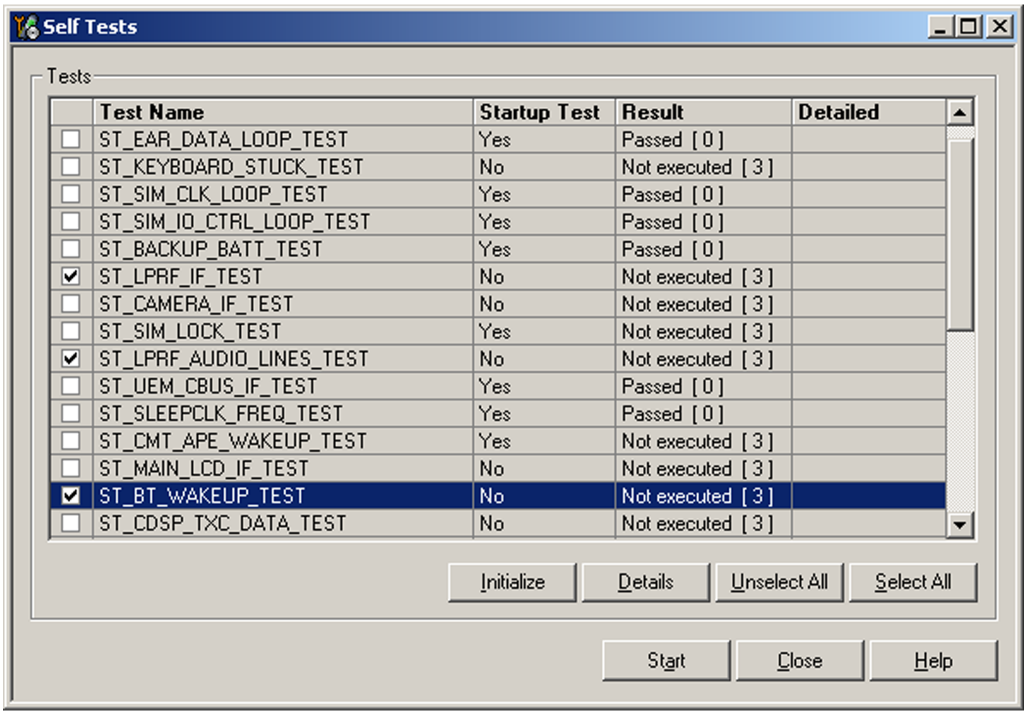
Figure 44 BER test result

Bluetooth self tests in Phoenix

Steps

1. Start *Phoenix* service software.

2. Choose**File→Scan Product.**
3. Place the phone to a flash adapter.
4. From the **Mode** drop-down menu, set mode to **Local**.
5. Choose **Testing→Self Tests.**
6. In the *Self Tests* window check the following Bluetooth related tests:
   - **ST_LPRF_IF_TEST**
   - **ST_LPRF_AUDIO_LINES_TEST**
   - **ST_BT_WAKEUP_TEST**
7. To run the tests, click **Start**.

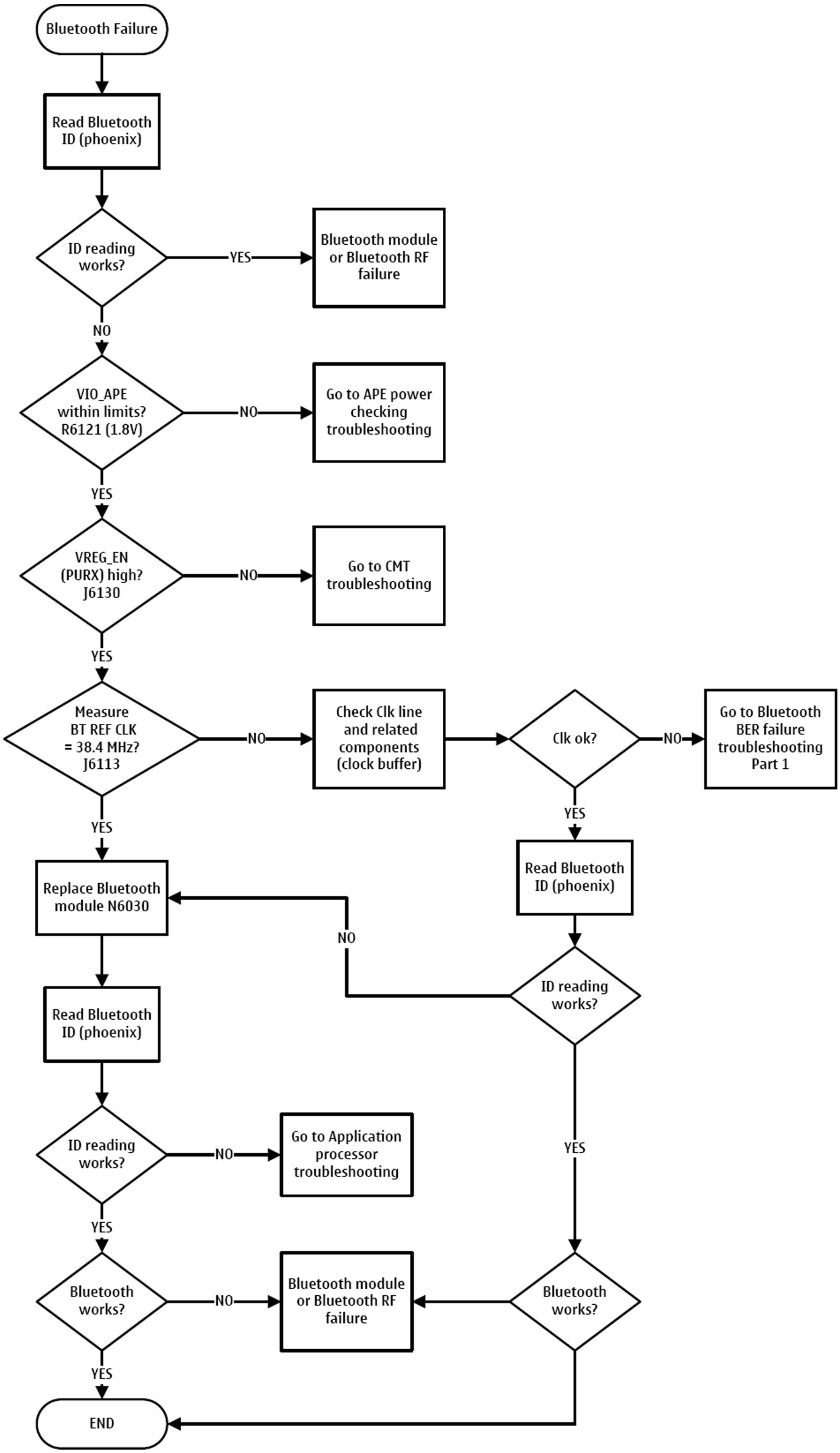


	Test Name	Startup Test	Result	Detailed
☐	ST_EAR_DATA_LOOP_TEST	Yes	Passed [0]	
☐	ST_KEYBOARD_STUCK_TEST	No	Not executed [3]	
☐	ST_SIM_CLK_LOOP_TEST	Yes	Passed [0]	
☐	ST_SIM_IO_CTRL_LOOP_TEST	Yes	Passed [0]	
☐	ST_BACKUP_BATT_TEST	Yes	Passed [0]	
☑	ST_LPRF_IF_TEST	No	Not executed [3]	
☐	ST_CAMERA_IF_TEST	No	Not executed [3]	
☐	ST_SIM_LOCK_TEST	Yes	Not executed [3]	
☑	ST_LPRF_AUDIO_LINES_TEST	No	Not executed [3]	
☐	ST_UEM_CBUS_IF_TEST	Yes	Passed [0]	
☐	ST_SLEEPCLK_FREQ_TEST	Yes	Passed [0]	
☐	ST_CMT_APE_WAKEUP_TEST	Yes	Not executed [3]	
☐	ST_MAIN_LCD_IF_TEST	No	Not executed [3]	
☑	ST_BT_WAKEUP_TEST	No	Not executed [3]	
☐	ST_CDSP_TXC_DATA_TEST	No	Not executed [3]	

Figure 45 Bluetooth self tests in *Phoenix*

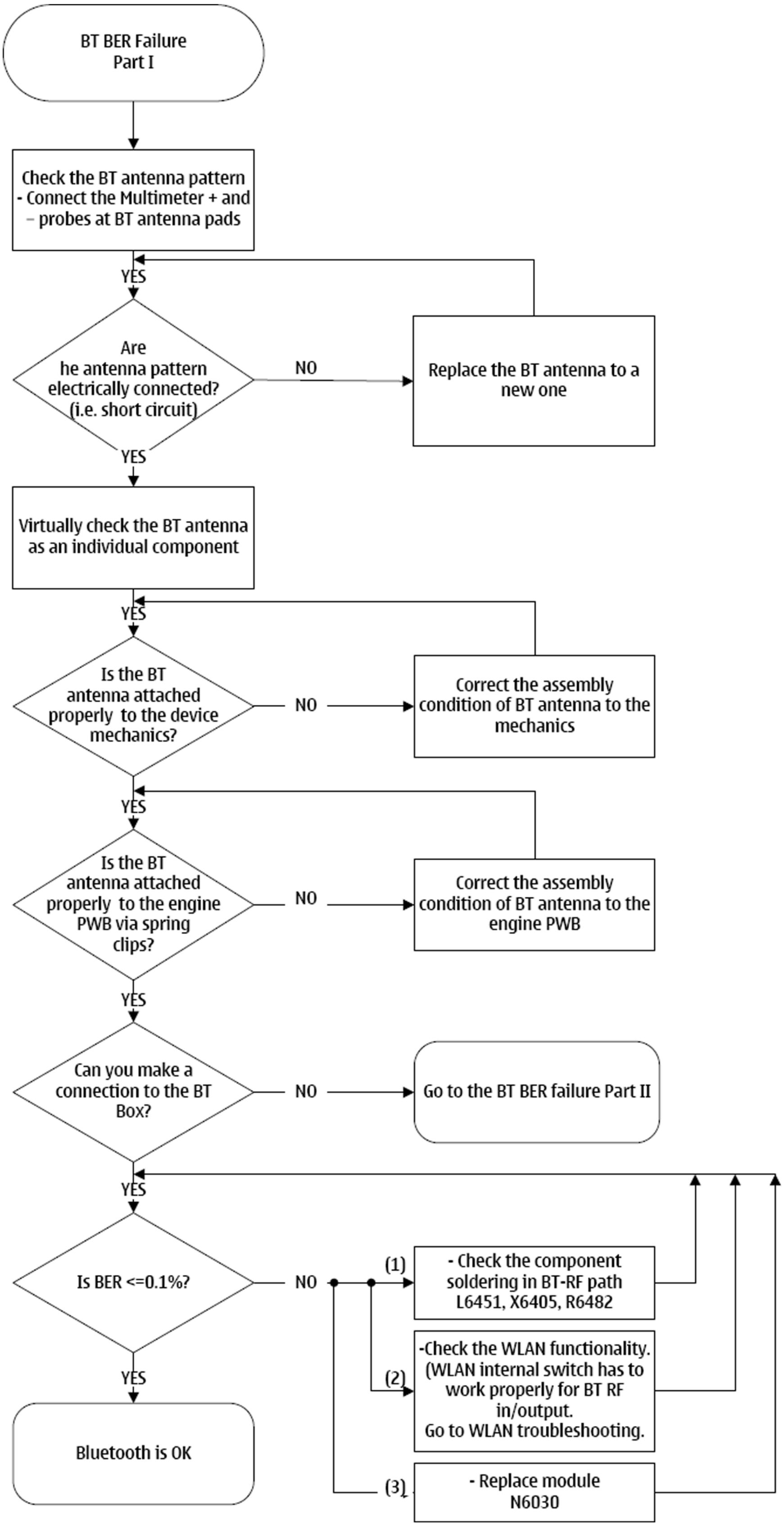
Bluetooth interface troubleshooting

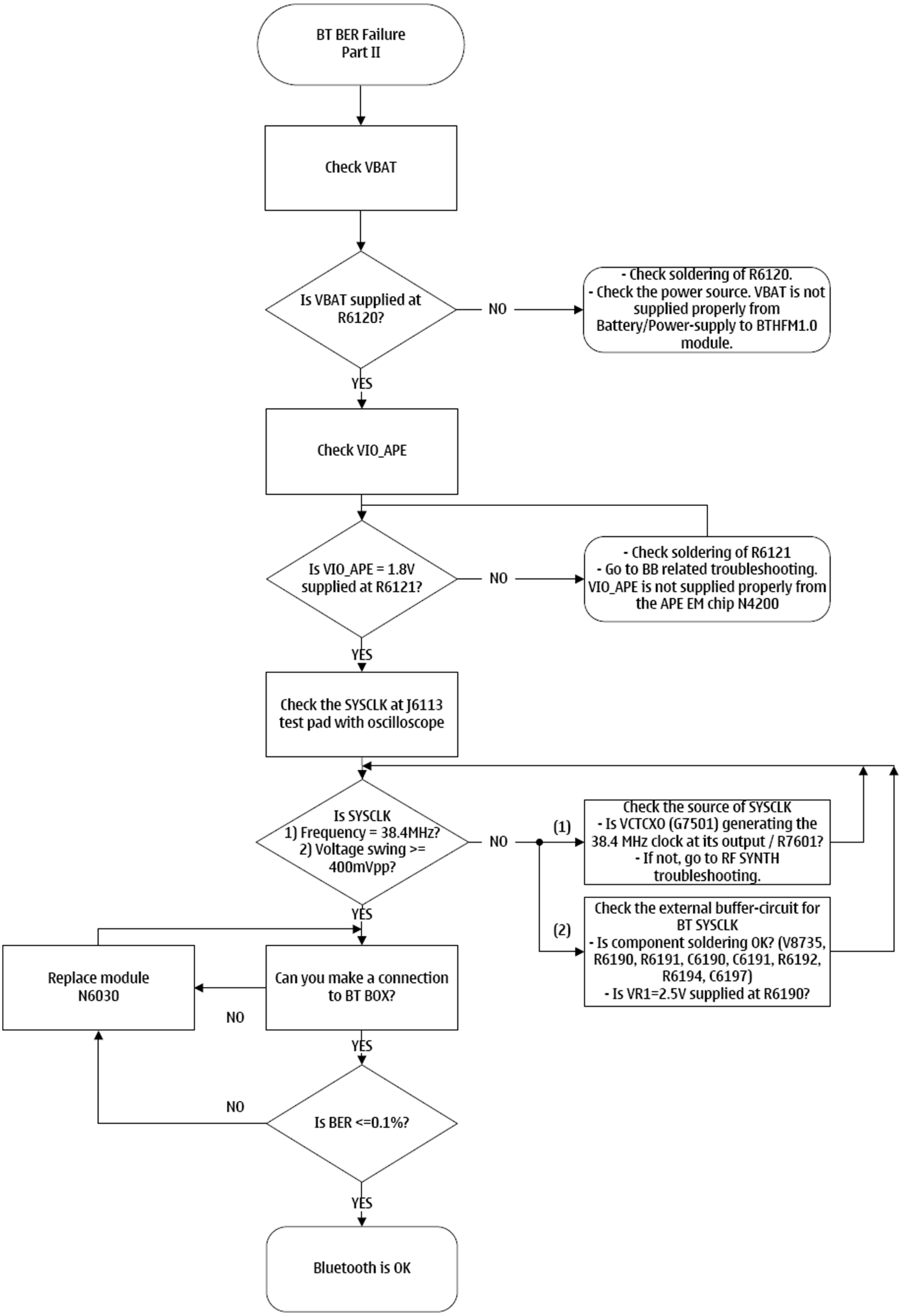
Troubleshooting flow


Bluetooth Failure
Read Bluetooth ID (phoenix)
ID reading works?
YES
Bluetooth module or Bluetooth RF failure
NO
VIO_APE within limits? R6121 (1.8V)
NO
Go to APE power checking troubleshooting
YES
VREG_EN (PURX) high? J6130
NO
Go to CMT troubleshooting
YES
Measure BT REF CLK = 38.4 MHz? J6113
NO
Check Clk line and related components (clock buffer)
Clk ok?
NO
Go to Bluetooth BER failure troubleshooting Part 1
YES
Read Bluetooth ID (phoenix)
ID reading works?
NO
YES
Replace Bluetooth module N6030
Read Bluetooth ID (phoenix)
ID reading works?
NO
Go to Application processor troubleshooting
YES
Bluetooth works?
NO
Bluetooth module or Bluetooth RF failure
Bluetooth works?
YES
END

Bluetooth Bit Error Rate failure troubleshooting

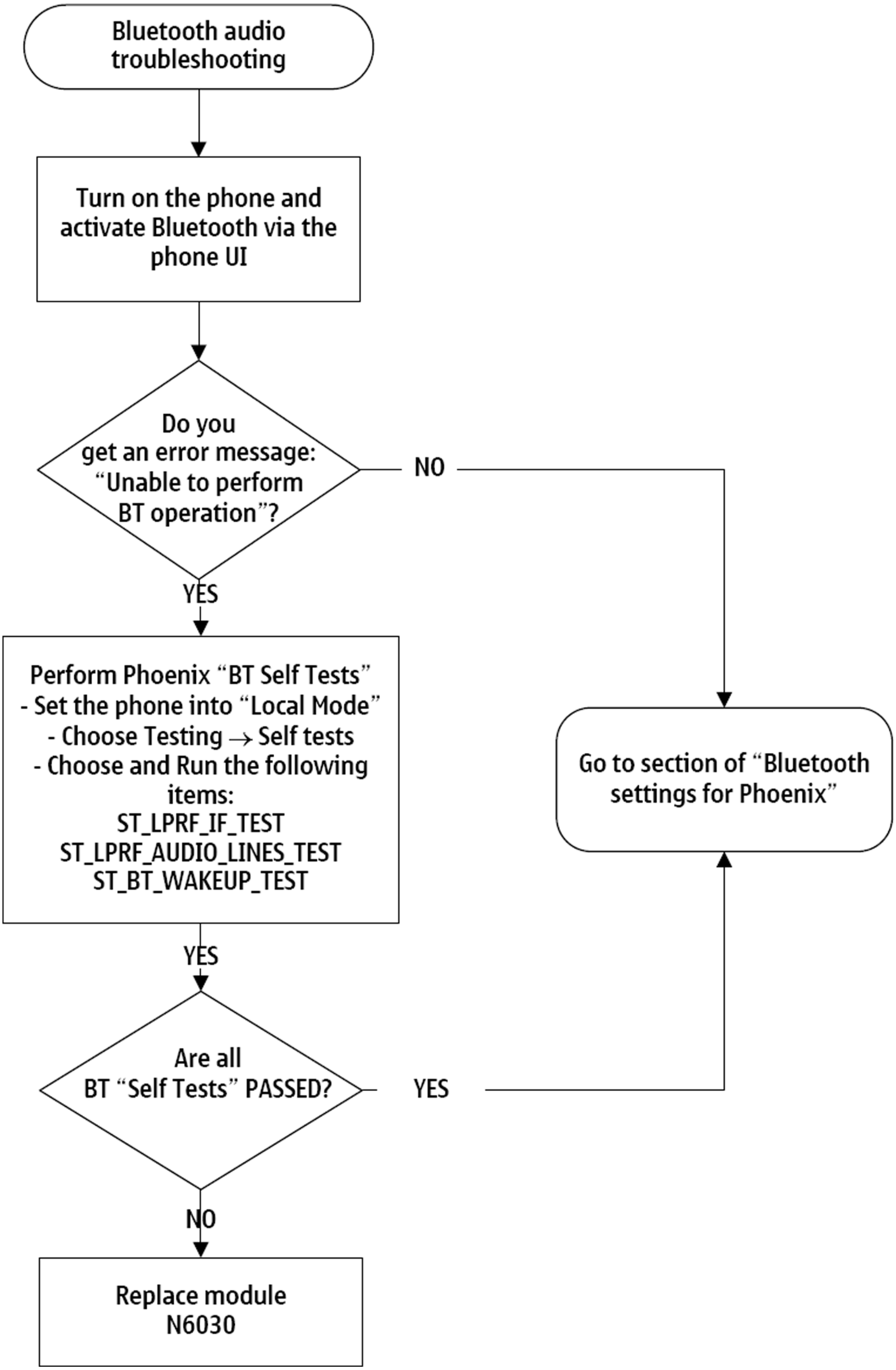
Troubleshooting flow


BT BER Failure
Part I
Check the BT antenna pattern
- Connect the Multimeter + and
– probes at BT antenna pads
YES
Are
he antenna pattern
electrically connected?
(i.e. short circuit)
NO
Replace the BT antenna to a new one
YES
Virtually check the BT antenna as an individual component
YES
Is the BT antenna attached properly to the device mechanics?
NO
Correct the assembly condition of BT antenna to the mechanics
YES
Is the BT antenna attached properly to the engine PWB via spring clips?
NO
Correct the assembly condition of BT antenna to the engine PWB
YES
Can you make a connection to the BT Box?
NO
Go to the BT BER failure Part II
YES
Is BER <=0.1%?
NO
(1)
- Check the component soldering in BT-RF path L6451, X6405, R6482
(2)
-Check the WLAN functionality. (WLAN internal switch has to work properly for BT RF in/output. Go to WLAN troubleshooting.
(3)
- Replace module N6030
YES
Bluetooth is OK


BT BER Failure
Part II
Check VBAT
Is VBAT supplied at R6120?
NO
- Check soldering of R6120.
- Check the power source. VBAT is not supplied properly from Battery/Power-supply to BTHFM1.0 module.
YES
Check VIO_APE
Is VIO_APE = 1.8V supplied at R6121?
NO
- Check soldering of R6121
- Go to BB related troubleshooting. VIO_APE is not supplied properly from the APE EM chip N4200
YES
Check the SYSCLK at J6113 test pad with oscilloscope
Is SYSCLK
1) Frequency = 38.4MHz?
2) Voltage swing >= 400mVpp?
NO
(1)
Check the source of SYSCLK
- Is VCTCXO (G7501) generating the 38.4 MHz clock at its output / R7601?
- If not, go to RF SYNTH troubleshooting.
(2)
Check the external buffer-circuit for BT SYSCLK
- Is component soldering OK? (V8735, R6190, R6191, C6190, C6191, R6192, R6194, C6197)
- Is VR1=2.5V supplied at R6190?
YES
Can you make a connection to BT BOX?
NO
Replace module N6030
YES
Is BER <=0.1%?
NO
YES
Bluetooth is OK

BT audio failure troubleshooting

Troubleshooting flow


Bluetooth audio troubleshooting
Turn on the phone and activate Bluetooth via the phone UI
Do you get an error message: “Unable to perform BT operation”?
NO
YES
Perform Phoenix “BT Self Tests”
- Set the phone into “Local Mode”
- Choose Testing → Self tests
- Choose and Run the following items:
ST_LPRF_IF_TEST
ST_LPRF_AUDIO_LINES_TEST
ST_BT_WAKEUP_TEST
YES
Are all BT “Self Tests” PASSED?
YES
NO
Go to section of “Bluetooth settings for Phoenix”
Replace module N6030

Audio troubleshooting

Audio troubleshooting test instructions

Differential external earpiece and internal earpiece outputs can be measured either with a single-ended or a differential probe.

When measuring with a single-ended probe each output is measured against the ground.

Internal handsfree output is measured using a current probe, if a special low-pass filter designed for measuring a digital amplifier is not available. Note also that when using a current probe, the input signal frequency must be set to 2 kHz.

The input signal for each loop test can be either single-ended or differential.

Required equipment

The following equipment is needed for the tests:

- Oscilloscope
- Function generator (sine waveform)
- 'Active speaker' or 'speaker and power amplifier'
- Sound level meter
- Current probe (Internal handsfree DPMA output measurement)
- Phoenix service software
- Battery voltage 3.7 V

Test procedure

Audio can be tested using the Phoenix audio routings option. Three different audio loop paths can be activated:

- External microphone to Internal earpiece
- External microphone to Internal handsfree speaker
- Internal microphone to External earpiece

Each audio loop sets routing from the specified input to the specified output enabling a quick in-out test. Loop path gains are fixed and they cannot be changed using Phoenix. Correct pins and signals for each test are presented in the following table.

Phoenix audio loop tests and test results

The results presented in the table apply when no accessory is connected and battery voltage is set to 3.7 V.

Earpiece, internal microphone and speaker are in place during measurement. Applying a headset accessory during measurement causes a significant drop in measured quantities.

The gain values presented in the table apply for a differential output vs. single-ended/differential input.

Loop test	Input terminal	Output terminal	Path gain [dB] (fixed)	Input voltage [mVp-p]	Differential output voltage [mVp-p]	Output DC level [V]	Output current [mA]
External Mic in External Speaker out	XMICP and GND	HSEAR R P, HSEAR R N and GND	2.9	280	390	1.25	N/A
		HSEAR P, HSEAR N and GND					
	XMICN and GND	HSEAR R P, HSEAR R N and GND					
		HSEAR P, HSEAR N and GND					
External Mic in HP Speaker out	XMICP and GND	EarP and GND	6.9	140	310	1.25	N/A
		EarN and GND					
	XMICN and GND	EarP and GND					
		EarN and GND					
External Mic in Internal Handsfree out	XMICP and GND	B1 pads	11.4	150	560	0	25 mA (calc.)
	XMICN and GND	B1 pads					
Digital Stereo Mic in External Earpiece out	B1 and B2	HSEAR R P, HSEAR R N and GND	NA	100 (dBA) Sound Pressure Level (SPL)	100	1.28	N/A
		HSEAR P, HSEAR N and GND					

Measurement data

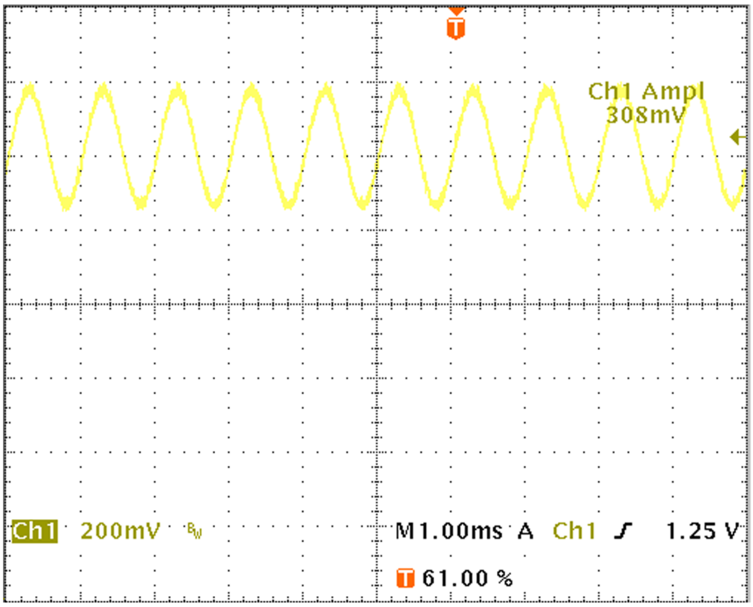
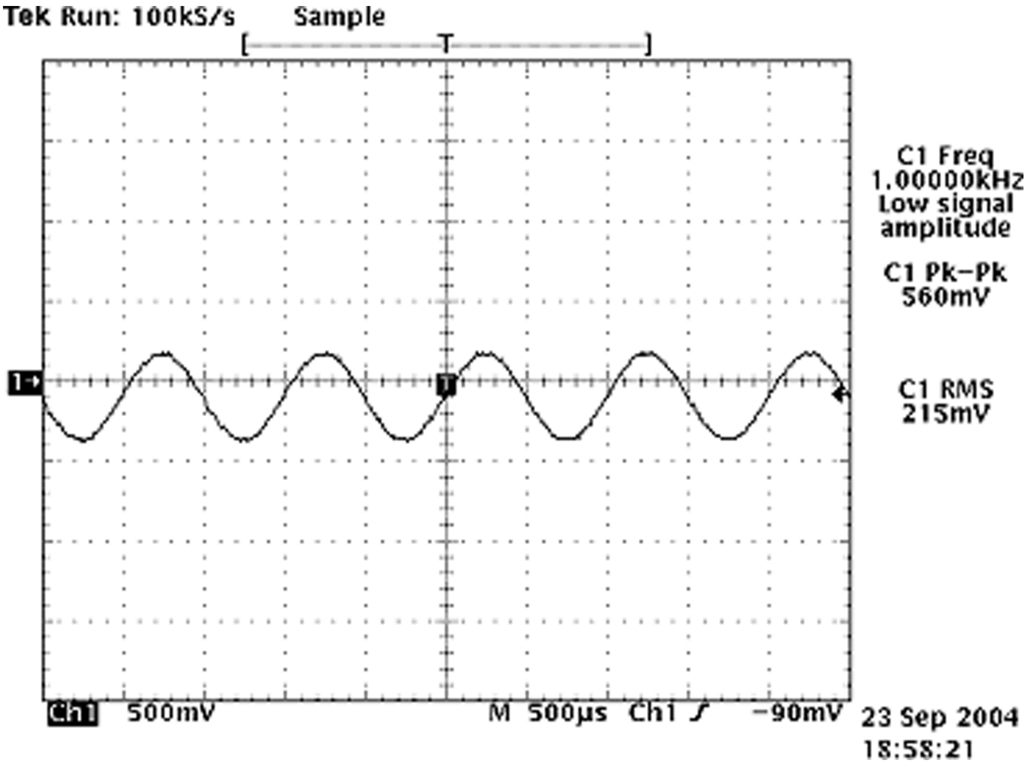


Figure 46 Single-ended output waveform of the Ext_in_HP_out measurement when earpiece is connected.



If a special low-pass filter designed for measuring digital amplifiers is unavailable, the measurement must be performed with a current probe and the input signal frequency must be 2kHz.

Figure 47 Differential output waveform of the Ext_in_IHF_out out loop measurement when speaker is connected.

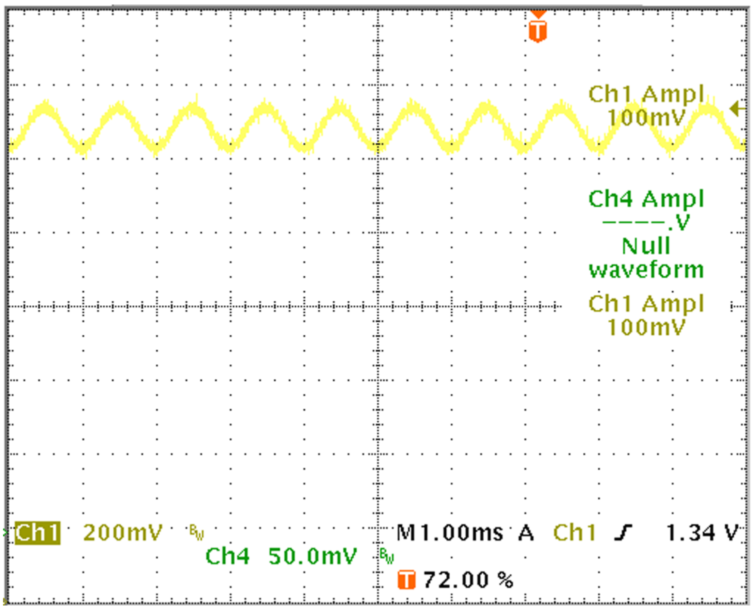
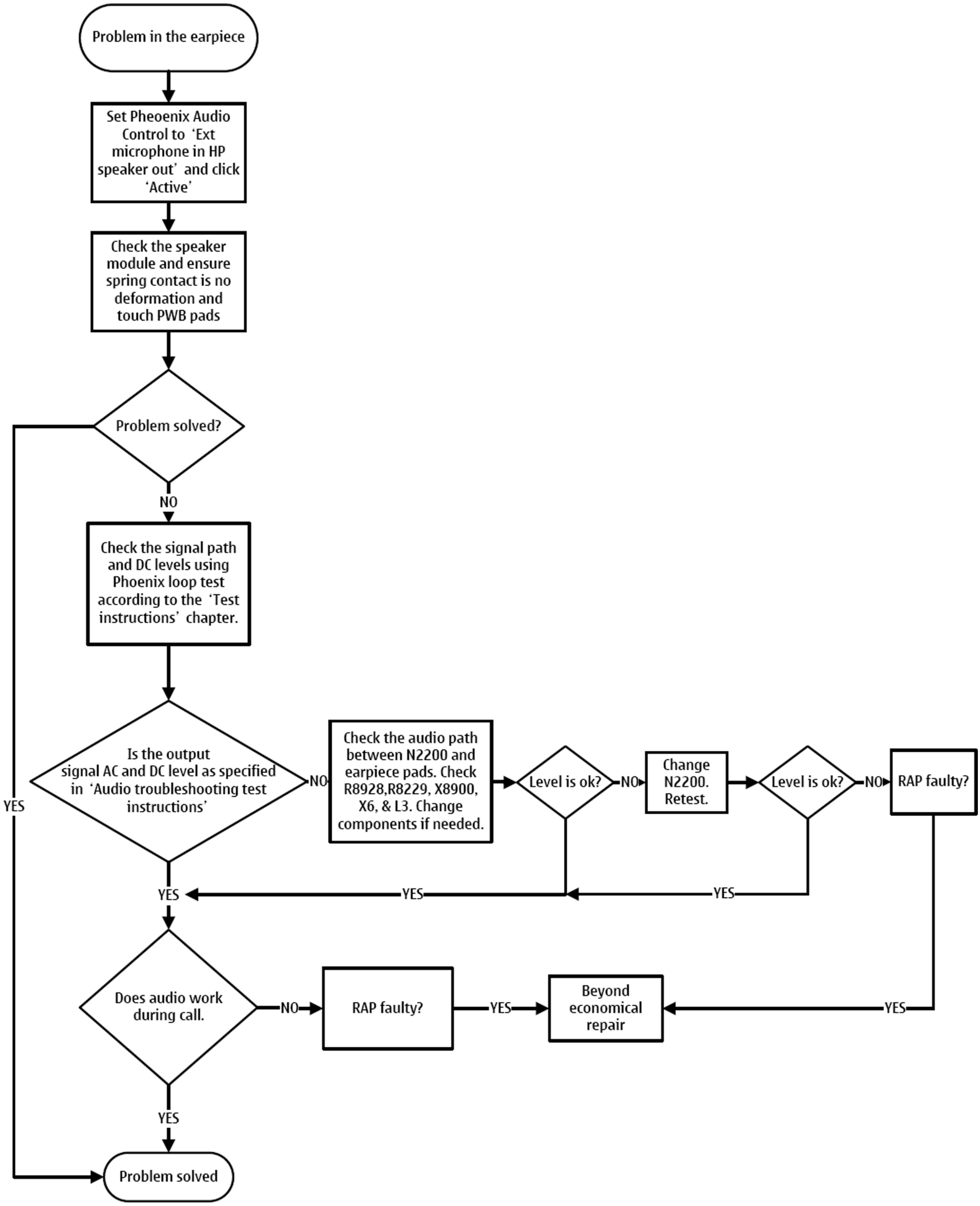

Ch1 Ampl
100mV
Ch4 Ampl
----.V
Null
waveform
Ch1 Ampl
100mV
Ch1 200mV
Ch4 50.0mV
M1.00ms A Ch1 ∫ 1.34 V
72.00 %

Figure 48 Single-ended output waveform of the HP_in_Ext_out loop when microphone is connected.

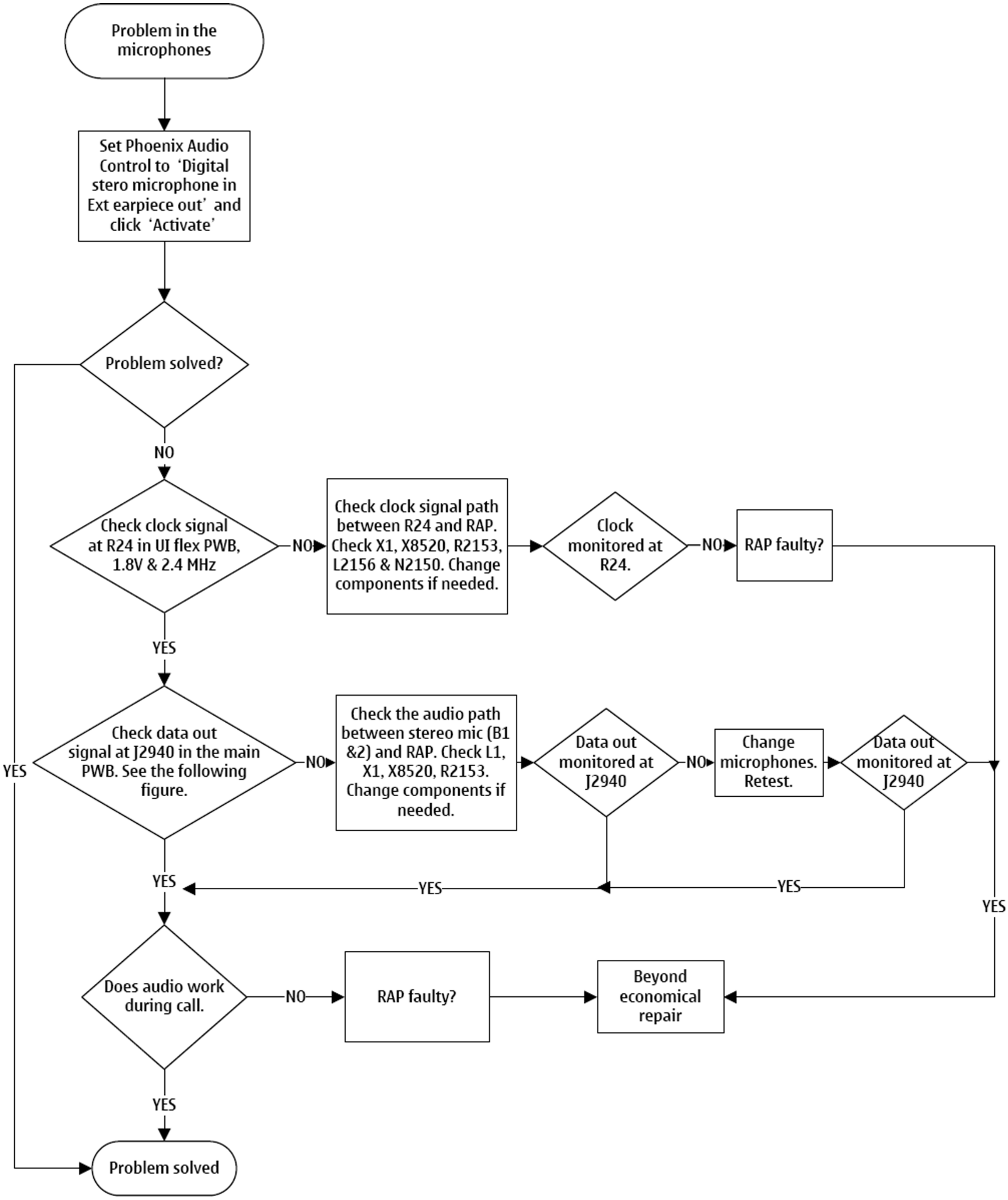
Internal earpiece troubleshooting

Troubleshooting flow


Problem in the earpiece
Set Pheoenix Audio Control to 'Ext microphone in HP speaker out' and click 'Active'
Check the speaker module and ensure spring contact is no deformation and touch PWB pads
Problem solved?
NO
YES
Check the signal path and DC levels using Phoenix loop test according to the 'Test instructions' chapter.
Is the output signal AC and DC level as specified in 'Audio troubleshooting test instructions'
NO
Check the audio path between N2200 and earpiece pads. Check R8928,R8229, X8900, X6, & L3. Change components if needed.
Level is ok?
NO
Change N2200. Retest.
Level is ok?
NO
RAP faulty?
YES
YES
YES
Does audio work during call.
NO
RAP faulty?
YES
Beyond economical repair
YES
YES
Problem solved

Internal digital microphone troubleshooting

Troubleshooting flow


Problem in the microphones
Set Phoenix Audio Control to 'Digital stero microphone in Ext earpiece out' and click 'Activate'
Problem solved?
NO
YES
Check clock signal at R24 in UI flex PWB, 1.8V & 2.4 MHz
NO
Check clock signal path between R24 and RAP. Check X1, X8520, R2153, L2156 & N2150. Change components if needed.
Clock monitored at R24.
NO
RAP faulty?
YES
Check data out signal at J2940 in the main PWB. See the following figure.
NO
Check the audio path between stereo mic (B1 &2) and RAP. Check L1, X1, X8520, R2153. Change components if needed.
Data out monitored at J2940
NO
Change microphones. Retest.
Data out monitored at J2940
YES
YES
YES
YES
Does audio work during call.
NO
RAP faulty?
Beyond economical repair
YES
Problem solved

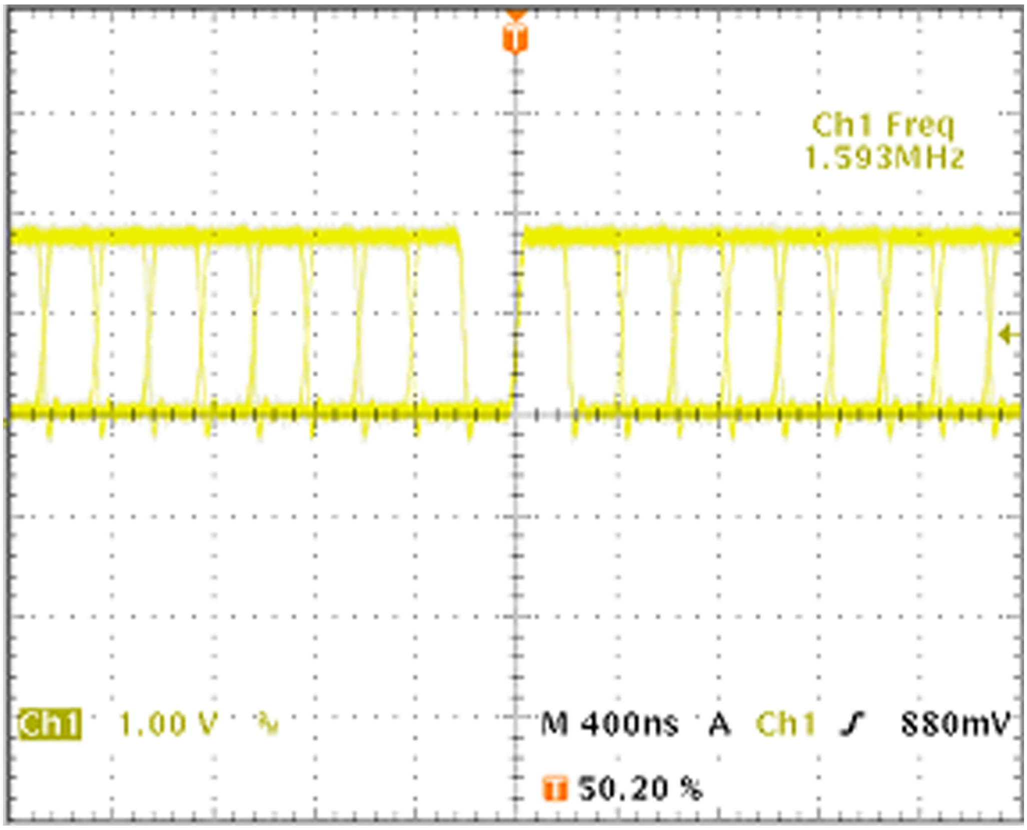
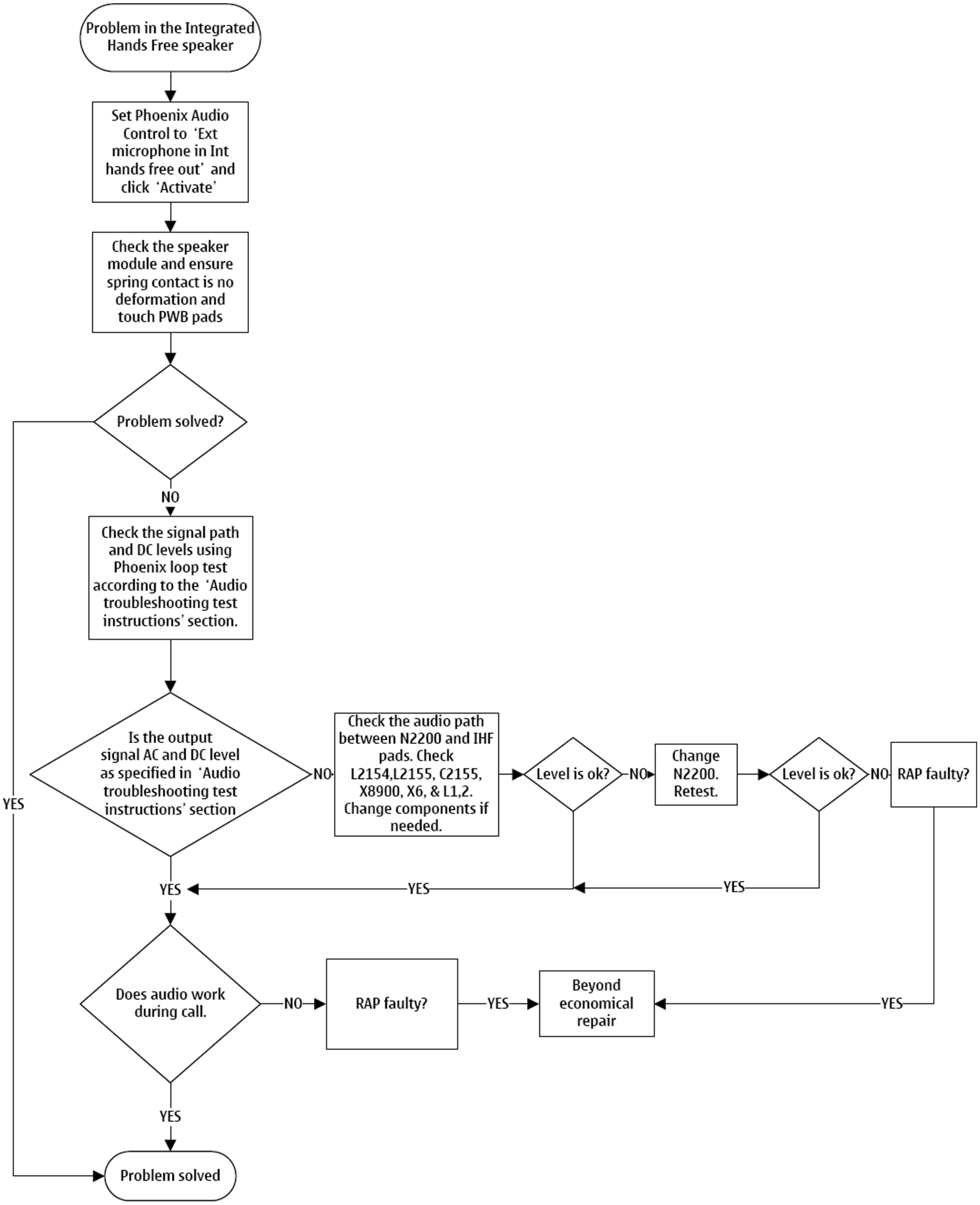

Ch1 Freq
1.593MHz
Ch1 1.00 V
M 400ns A Ch1 ∫ 880mV
50.20 %

Figure 49 Signal waveform on data out

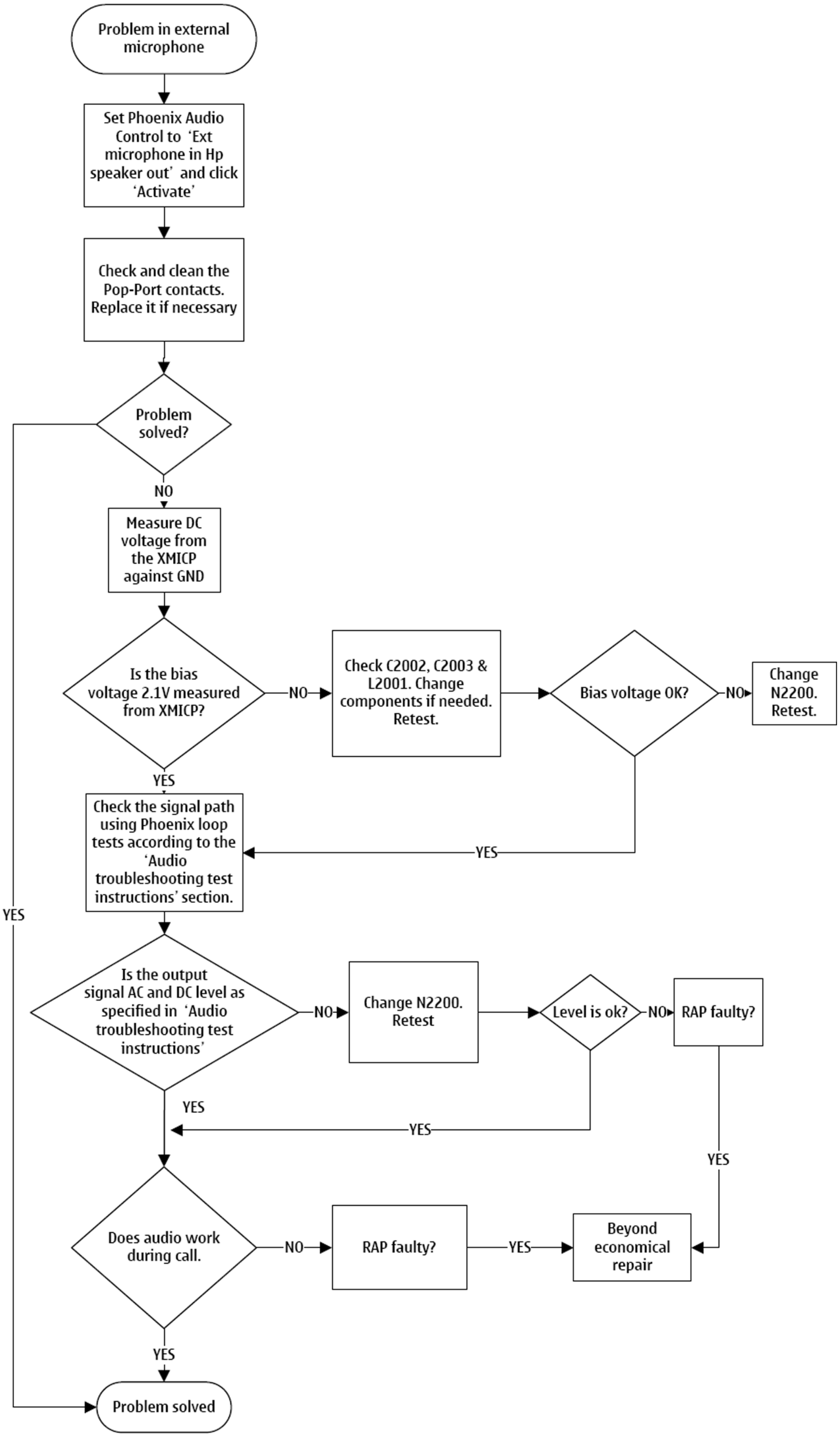
IHF troubleshooting

Troubleshooting flow


Problem in the Integrated Hands Free speaker
Set Phoenix Audio Control to 'Ext microphone in Int hands free out' and click 'Activate'
Check the speaker module and ensure spring contact is no deformation and touch PWB pads
Problem solved?
NO
YES
Check the signal path and DC levels using Phoenix loop test according to the 'Audio troubleshooting test instructions' section.
Is the output signal AC and DC level as specified in 'Audio troubleshooting test instructions' section
NO
Check the audio path between N2200 and IHF pads. Check L2154,L2155, C2155, X8900, X6, & L1,2. Change components if needed.
Level is ok?
NO
Change N2200. Retest.
Level is ok?
NO
RAP faulty?
YES
YES
YES
Does audio work during call.
NO
RAP faulty?
YES
Beyond economical repair
YES
YES
Problem solved

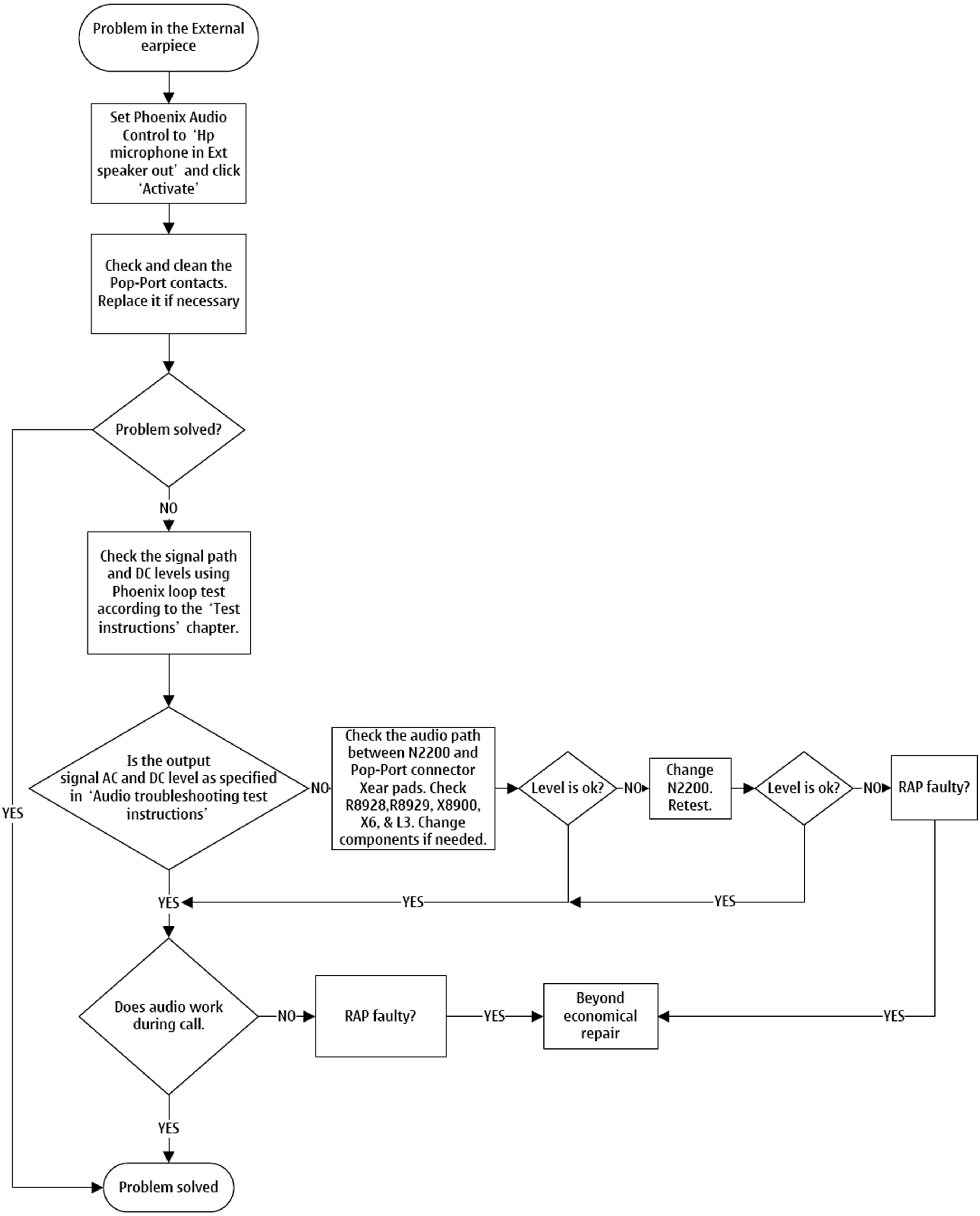
External microphone troubleshooting

Troubleshooting flow


Problem in external microphone
Set Phoenix Audio Control to 'Ext microphone in Hp speaker out' and click 'Activate'
Check and clean the Pop-Port contacts. Replace it if necessary
Problem solved?
NO
YES
Measure DC voltage from the XMICP against GND
Is the bias voltage 2.1V measured from XMICP?
NO
Check C2002, C2003 & L2001. Change components if needed. Retest.
Bias voltage OK?
NO
Change N2200. Retest.
YES
YES
Check the signal path using Phoenix loop tests according to the 'Audio troubleshooting test instructions' section.
Is the output signal AC and DC level as specified in 'Audio troubleshooting test instructions'
NO
Change N2200. Retest
Level is ok?
NO
RAP faulty?
YES
YES
YES
Does audio work during call.
NO
RAP faulty?
YES
Beyond economical repair
YES
Problem solved

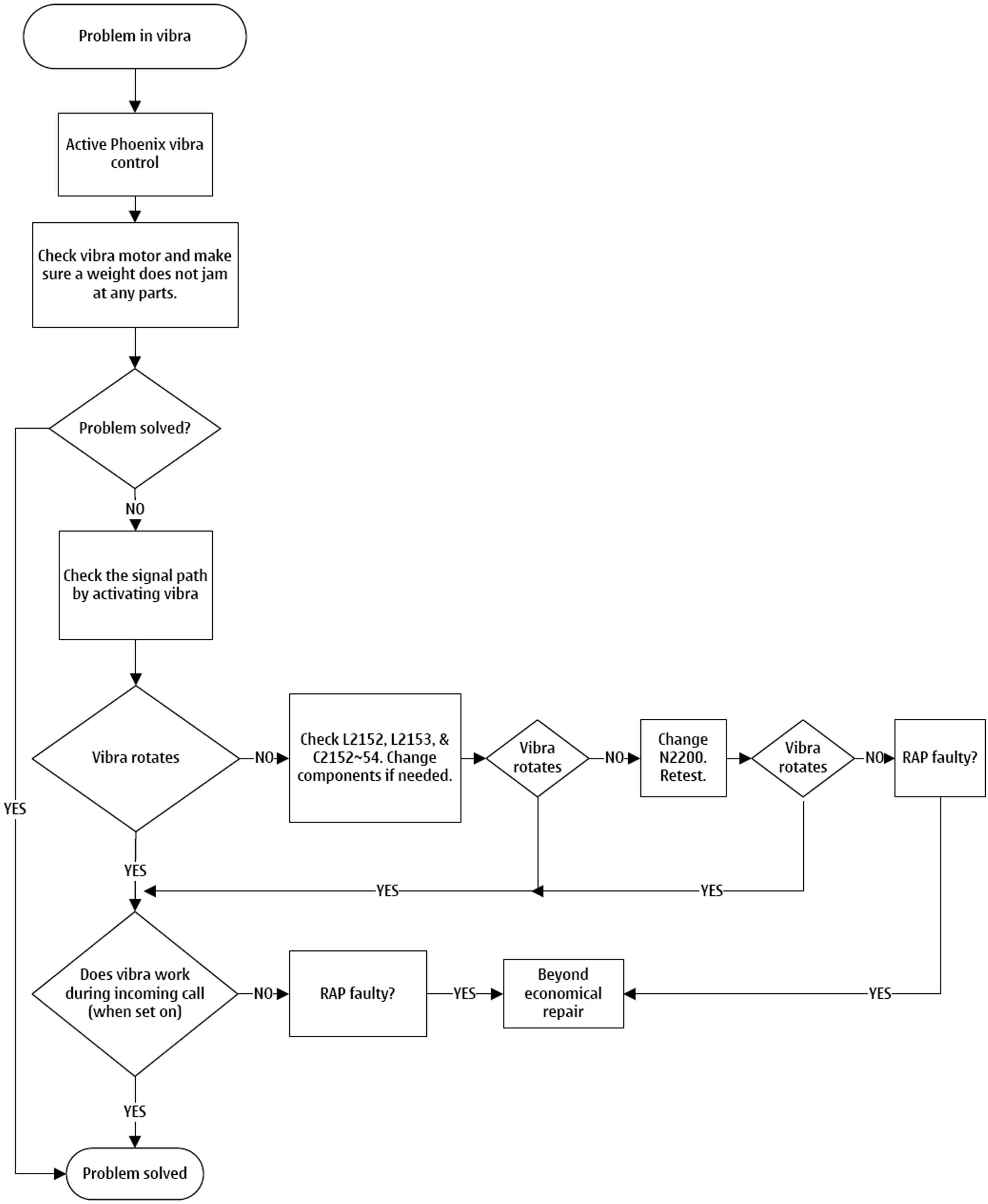
External earpiece troubleshooting

Troubleshooting flow


Problem in the External earpiece
Set Phoenix Audio Control to 'Hp microphone in Ext speaker out' and click 'Activate'
Check and clean the Pop-Port contacts. Replace it if necessary
Problem solved?
NO
YES
Check the signal path and DC levels using Phoenix loop test according to the 'Test instructions' chapter.
Is the output signal AC and DC level as specified in 'Audio troubleshooting test instructions'
NO
Check the audio path between N2200 and Pop-Port connector Xear pads. Check R8928,R8929, X8900, X6, & L3. Change components if needed.
Level is ok?
NO
Change N2200. Retest.
Level is ok?
NO
RAP faulty?
YES
YES
YES
Does audio work during call.
NO
RAP faulty?
YES
Beyond economical repair
YES
YES
Problem solved

Vibra troubleshooting

Troubleshooting flow


Problem in vibra
Active Phoenix vibra control
Check vibra motor and make sure a weight does not jam at any parts.
Problem solved?
NO
YES
Check the signal path by activating vibra
Vibra rotates
NO
Check L2152, L2153, & C2152~54. Change components if needed.
Vibra rotates
NO
Change N2200. Retest.
Vibra rotates
NO
RAP faulty?
YES
YES
YES
YES
Does vibra work during incoming call (when set on)
NO
RAP faulty?
YES
Beyond economical repair
YES
YES
Problem solved

Baseband manual tuning guide

Energy management calibration

Prerequisites

Energy Management (EM) calibration is performed to calibrate the setting (gain and offset) of AD converters in several channels (that is, **battery voltage**, **BSI**, **battery current**) to get an accurate AD conversion result.

Hardware setup:

- An external power supply is needed.
- Supply 12V DC from an external power supply to CU-4 to power up the phone.
- The phone must be connected to a CU-4 control unit with a product-specific flash adapter.

Steps

1. Place the phone to the docking station adapter (CU-4 is connected to the adapter).
2. Start *Phoenix* service software.
3. Choose **File→ Scan Product.**
4. Choose **Tuning→Energy Management Calibration.**
5. To show the current values in the phone memory, click **Read**, and check that communication between the phone and CU-4 works.
6. Check that the **CU-4 used** check box is checked.
7. Select the item(s) to be calibrated.

   Note: ADC calibration has to be performed before other item(s). However, if all calibrations are selected at the same time, there is no need to perform the ADC calibration first.

8. Click **Calibrate**.

   The calibration of the selected item(s) is carried out automatically.

   The candidates for the new calibration values are shown in the *Calculated values* column. If the new calibration values seem to be acceptable (please refer to the following "Calibration value limits" table), click **Write** to store the new calibration values to the phone permanent memory.

Table 13 Calibration value limits

Parameter	Min.	Max.
ADC Offset	-20	20
ADC Gain	12000	14000
BSI Gain	1100	1300
VBAT Offset	2400	2650
VBAT Gain	19000	23000
VCHAR Gain	N/A	N/A
IBAT (ICal) Gain	7750	12250

9. Click **Read**, and confirm that the new calibration values are stored in the phone memory correctly. If the values are not stored to the phone memory, click **Write** and/or repeat the procedure again.
10. To end the procedure, close the *Energy Management Calibration* window.

7 — RF Troubleshooting and Tuning Guide

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Introduction to RF troubleshooting

The first step in fault finding should always be a visual inspection. Carefully inspect the RF area using a microscope, and look for solder bridges, missing components, short circuits, components that have partially come off and other anomalies. Check capacitors to see if they are not short-circuited, and inductors if they are not open circuits. Also check that power supply lines are not short-circuited, meaning that they are not 0Ω to ground.

All measurements should be done using:

- Multimeter for measuring voltage and resistance
- Spectrum analyzer with a high-frequency, high-impedance probe (LO / reference frequencies and RF power levels)
- Oscilloscope (DC-voltages and low frequency signals)

> **Caution:** Radiated WCDMA Tx measurements, such as when using an RF coupler, must always be performed inside a shielded room or box. Conducted measurements with power levels higher than 0 dBm must also be conducted inside a shielded box, because some power will inevitably leak to the antenna. Even low WCDMA power levels may disturb nearby WCDMA networks and cause problems to 3G operators.

The cellular RF section of the phone is built around the RF module N7501. This module contains RF Tx and Rx filters as well as the RF IC N7505, which takes care of up- and down-conversions and variable gain amplification, for example. Other major RF components include GSM/EDGE PA , WCDMA PA, VCO , and VCTCXO. An SMPS component is used to feed supply voltage to the WCDMA PA for optimized power efficiency.

Please note that the PAs also have a big grounding pad under the module itself. This pad works to diffuse the heat that is generated inside the module. Because of the heat-spreading properties of this pad, ensure that the soldering is done properly, if you replace either of the two PAs.

Because most RF semiconductors are static discharge sensitive, use ESD protection when handling the electronic components of the phone. Ground straps and ESD soldering irons are mandatory. Some RF components are also moisture sensitive, so they must be pre-baked prior to soldering.

The PWB also contains many discrete components, including resistors, inductors and capacitors. Troubleshooting these components is mainly done by making sure they are properly soldered to the board. Capacitors and resistors can be checked for shorts using an ohm-meter, but be aware that in-circuit resistance and capacitance measurements are typically not very accurate. Also keep in mind that all measured voltages and RF levels in the service manual are approximate figures. Especially RF levels, may vary because of variations in measurement equipment and grounding of the RF probe.

RF key component placement

The RF section of the phone is build around one main RF ASIC N7501.

There are also two PAs on the board: one for GSM (N7502), which is located in the TXFEM module, also containing the GSM quad-band antenna switch module. The other PA is for WCDMA (N7503).

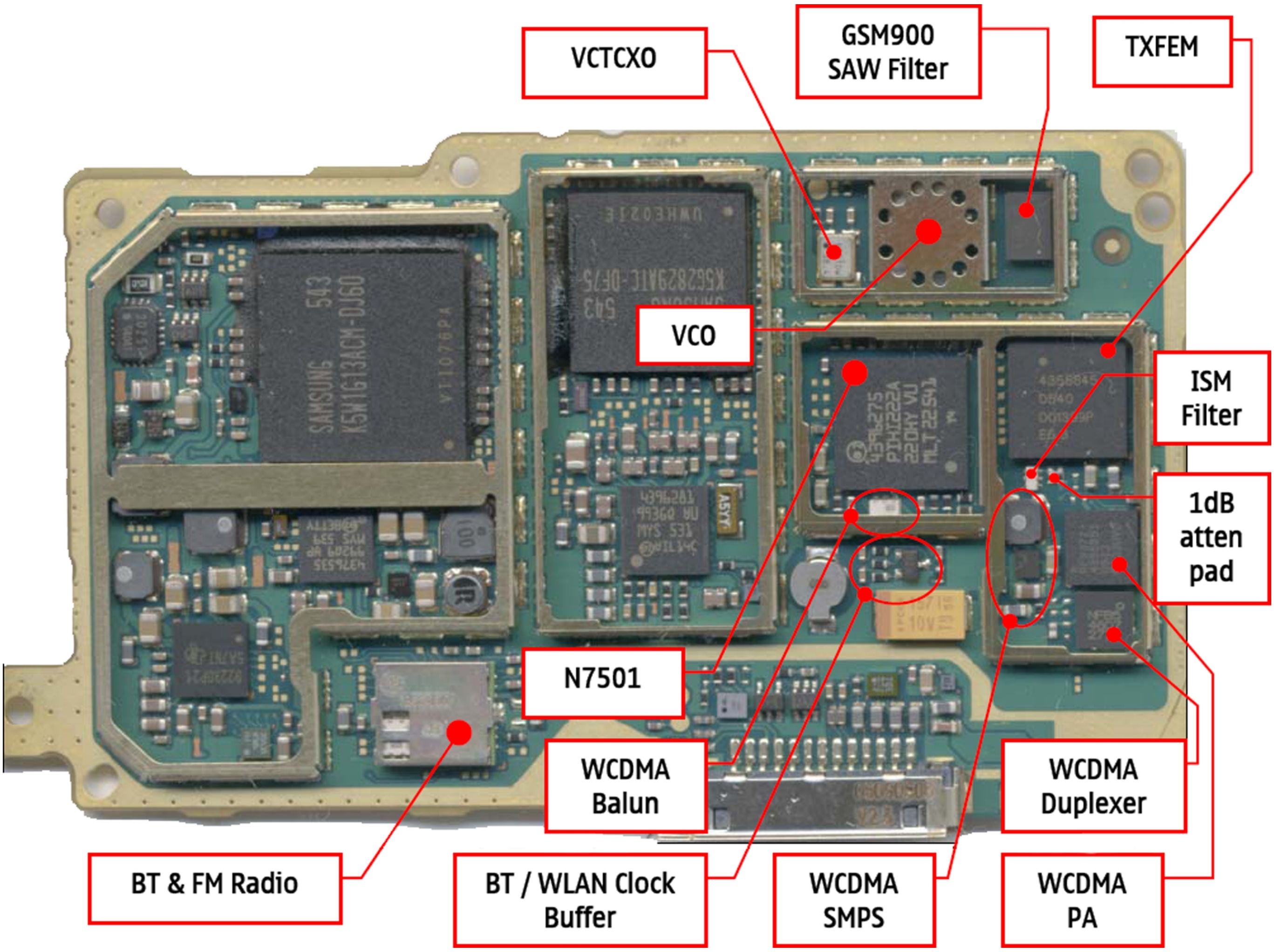

VCTCXO
GSM900
SAW Filter
TXFEM
VCO
ISM
Filter
1dB
atten
pad
N7501
WCDMA
Balun
WCDMA
Duplexer
BT & FM Radio
BT / WLAN Clock
Buffer
WCDMA
SMPS
WCDMA
PA

Figure 50 RF key component placement - top

Components on PWB Top Side	Schematics ref.
Tx ASIC	N7501
WCDMA PA	N7503
WCDMA SMPS	N7504
WCDMA Duplexer	Z7501
WCDMA Balun	T7501
GSM SAW Filter	Z7503
ISM Filter (ISM band = 2400-2483.5MHz)	Z7600
TXFEM (GSM PA & ASM)	
[ASM = Antenna Switch Module]	N7502
VCO	G7502
VCO Balun	T7502
VCTCXO	G7501
Clock Buffer	V8735

Components on PWB Top Side	Schematics ref.
BT & FM Radio	N6030

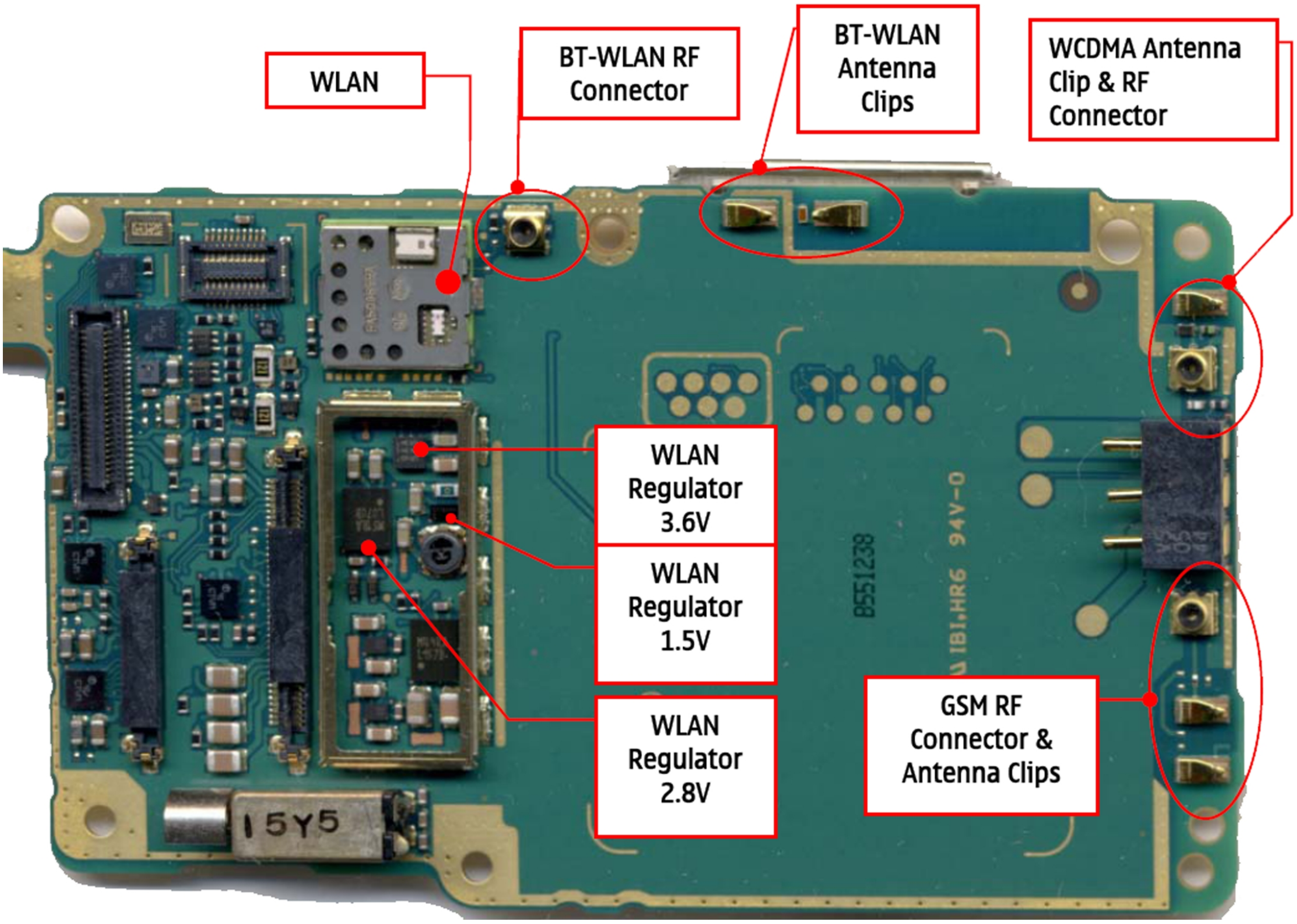

WLAN
BT-WLAN RF Connector
BT-WLAN Antenna Clips
WCDMA Antenna Clip & RF Connector
WLAN Regulator 3.6V
WLAN Regulator 1.5V
WLAN Regulator 2.8V
GSM RF Connector & Antenna Clips
15Y5
B551238
IBI.HR6 94V-0

Figure 51 RF key component placement - bottom

Components on PWB Bottom Side	Schematics ref.
WLAN	N6302
WLAN Regulator, 1.5V	N6300
WLAN Regulator, 2.8V	N6301
WLAN Regulator, 3.6V	N6303
GSM RF Connector	X7601
WCDMA RF Connector	X7602
BT / WLAN RF Connector	X6405
GSM Antenna Pads	X7600, X7605
WCDMA Antenna Pads	X7603
BT / WLAN Antenna Pads	X6402, X6403

Troubleshooting test point locations

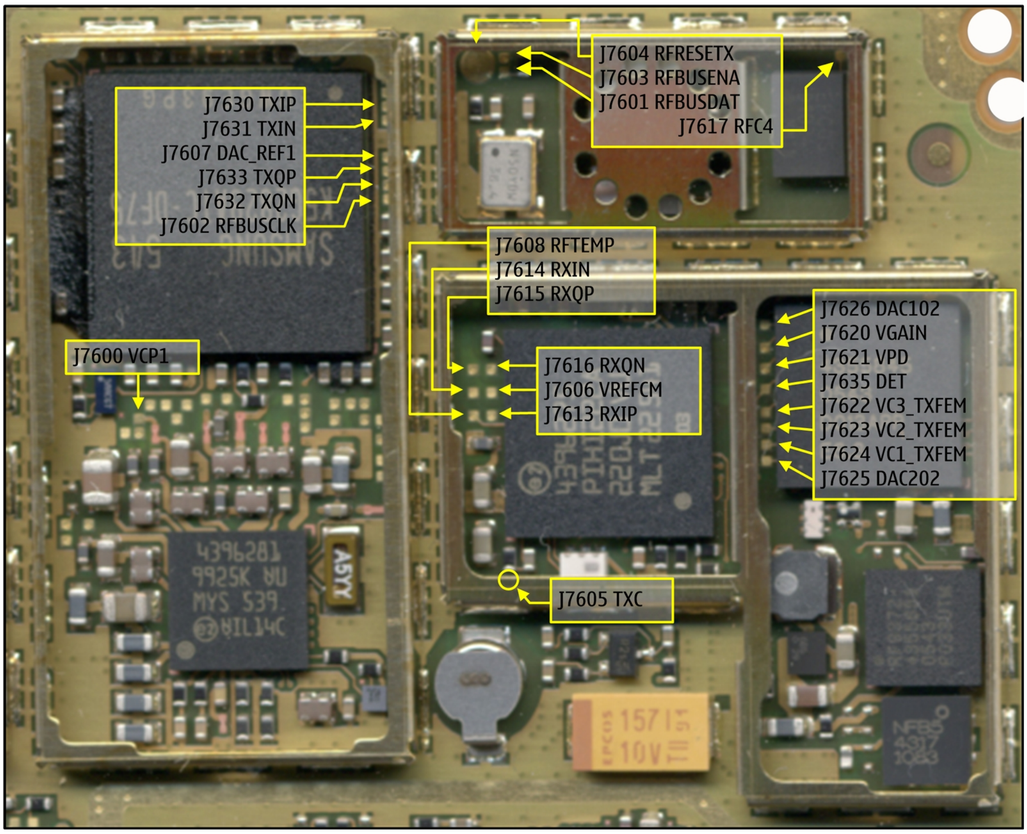

J7604 RFRESETX
J7603 RFBUSENA
J7601 RFBUSDAT
J7617 RFC4
J7630 TXIP
J7631 TXIN
J7607 DAC_REF1
J7633 TXQP
J7632 TXQN
J7602 RFBUSCLK
J7608 RFTEMP
J7614 RXIN
J7615 RXQP
J7626 DAC102
J7620 VGAIN
J7621 VPD
J7635 DET
J7622 VC3_TXFEM
J7623 VC2_TXFEM
J7624 VC1_TXFEM
J7625 DAC202
J7600 VCP1
J7616 RXQN
J7606 VREFCM
J7613 RXIP
J7605 TXC

Figure 52 Troubleshooting test points 1

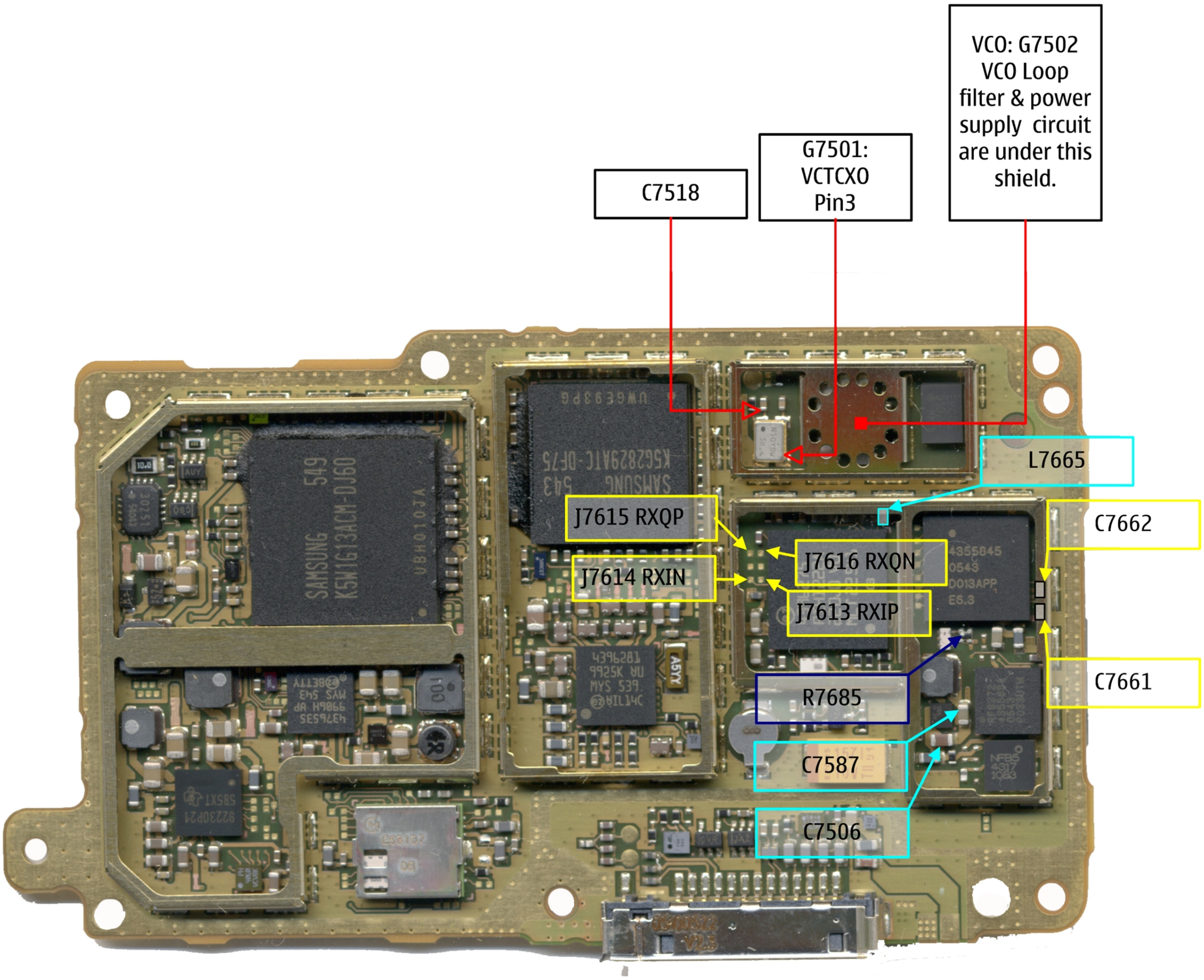

C7518
G7501:
VCTCXO
Pin3
VCO: G7502
VCO Loop
filter & power
supply circuit
are under this
shield.
L7665
J7615 RXQP
C7662
J7616 RXQN
J7614 RXIN
J7613 RXIP
C7661
R7685
C7587
C7506

Figure 53 Troubleshooting test points 2

Table 14 Cellular engine: RF – BB interface test pads

Test pad	Name	Explanation	Value
J7600	VCP1	Charge pump voltage	4.75 V
J7613	RXIP	Receive I-Q signals GSM & WCDMA N7501 (RF IC) -> RAP (BB IC)	1.5 Vpp (max) 0.75 Vdc (typ)
J7614	RXIN		
J7615	RXQP		
J7616	RXQN		
J7601	RFBUSDAT	BB -RF bus data-signal	1.8 V typ, 1.5 V min
J7602	RFBUSCLK	BB - RF bus clock	1.8V / 19.2 MHz
J7603	RFBUSENA	BB - RF bus enable signal	1.8 V typ, 1.5 V min
J7604	RFRESETX	BB - RF bus reset signal	1.8 V typ, 1.5 V min
J7605	TXC	AGC control voltage	0 ~ 2.35 V

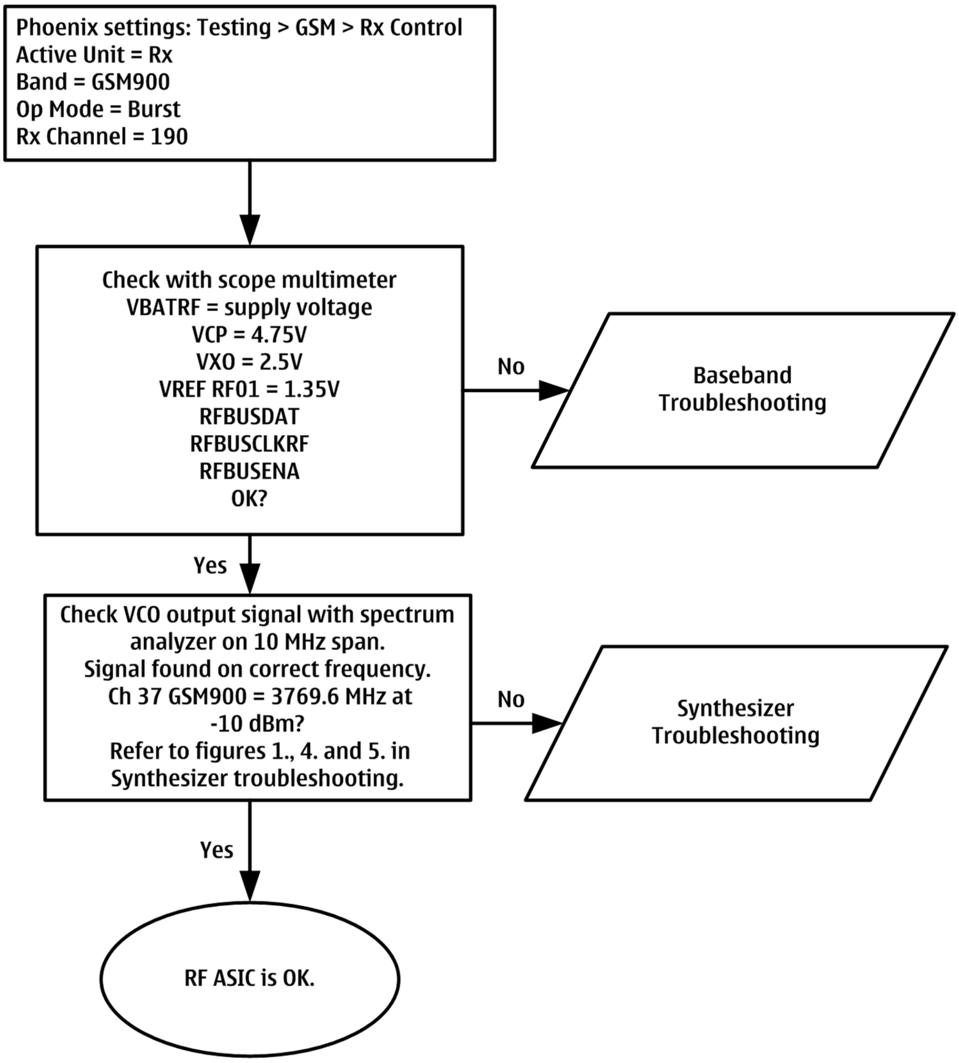
Test pad	Name	Explanation	Value
J7630	TXIP	Transmit I-Q signals GSM & WCDMA RAP (BB IC) -> N7501 (RF IC)	0.625-0.7 Vdc
J7631	TXIN		
J7632	TXQN		
J7633	TXQP		
J7606	VREFCM	Reference voltage for RX ADCs in RAP	0.75 V (typ)
J7607	DAC_REF1	Temp/process dependent ref current for TXIQ DACs in RAP	1 V (max)
J7608	RFTEMP	RF temperature sensor output	0.8V~0.9 V

Table 15 Cellular engine: RF front end test pads

Test pad	Name	Explanation	Value
J7635	DET	TXFEM power detector output voltage	Vdet=0.12~2.2V
J7626	DAC102	TXFEM bias control current	0~2mA
J7620	VGAIN	TXFEM Mode select	Hi = 1.16~2.75V
		HI = EDGE, LO = GMSK	Lo = 0~0.585V
J7621	VPD	TXFEM supply voltage for control logic	2.65 ~ 2.75V
J7622	VC3_TXFEM	TXFEM antenna switch control (selection of GSM band + TX/RX)	Hi = 1.16~2.75V
J7623	VC2_TXFEM		Lo = 0~0.585V
J7624	VC1_TXFEM		
J7625	DAC202	TXFEM bias control current	0~2mA
J7617	RFC4	GSM850/900 Switch & SAW filter control voltage. GSM900=>Lo	Hi = 2.4~2.8V (850)
			Lo = 0~0.2V

RF ASIC troubleshooting

Troubleshooting flow


Phoenix settings: Testing > GSM > Rx Control
Active Unit = Rx
Band = GSM900
Op Mode = Burst
Rx Channel = 190
Check with scope multimeter
VBATRF = supply voltage
VCP = 4.75V
VXO = 2.5V
VREF RF01 = 1.35V
RFBUSDAT
RFBUSCLKRF
RFBUSENA
OK?
No
Baseband Troubleshooting
Yes
Check VCO output signal with spectrum analyzer on 10 MHz span.
Signal found on correct frequency.
Ch 37 GSM900 = 3769.6 MHz at -10 dBm?
Refer to figures 1., 4. and 5. in Synthesizer troubleshooting.
No
Synthesizer Troubleshooting
Yes
RF ASIC is OK.

Synthesizer troubleshooting

Troubleshooting flow

Phoenix settings: Testing > GSM > RF controls
Active Unit = Rx
Band GSM900/GSM1800/GSM1900
Rx Channel = 37 GSM900
Rx Channel = 700 GSM1800
Rx Channel = 661 GSM1900
Operation Mode = Continuous
AGC = maximum value (Default)

Check VCO output signal using High Frequency probe with spectrum analyzer on 10 MHz span.
Signal Found on correct frequency?
Ch37 GSM900 = 3769.6 MHz [Fig.1]
Ch700 GSM1800 = 3685.6 MHz [Fig.2]
Ch661 GSM1900 = 3920 MHZ [Fig.3]

Test point : Touch high frequency probe on the side wall of RF shield can (Figs 4 & 5).
Assumed signal level is around -60 ~ -80 dBm

(Note: Because all VCO synthesizer components are under a fixed shield can, the purpose of this troubleshooting is to confirm the VCO frequency of the VCO signal leakage.)

Yes → Synthesizer is OK

No ↓

Check Voltage supply of RF ASIC. If these are OK, Replace RF ASIC.
After RF ASIC replacement, VCO start working?

Yes → End

No ↓

VCO or synthesizer circuit problem -> beyond economical repair.

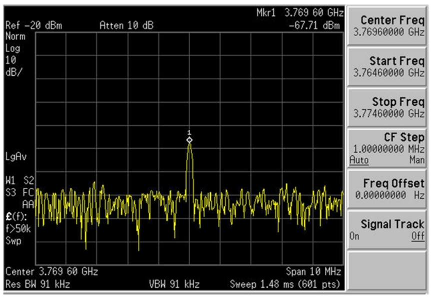

Ref -20 dBm
Atten 10 dB
Mkr1 3.769 60 GHz
-67.71 dBm
Norm
Log
10
dB/
LgAv
W1 S2
S3 FC
AA
£(f):
f>50k
Swp
Center 3.769 60 GHz
Res BW 91 kHz
VBW 91 kHz
Span 10 MHz
Sweep 1.48 ms (601 pts)
Center Freq
3.76960000 GHz
Start Freq
3.76460000 GHz
Stop Freq
3.77460000 GHz
CF Step
1.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off

Fig.1

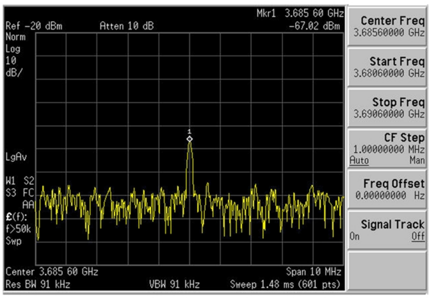

Ref -20 dBm
Atten 10 dB
Mkr1 3.685 60 GHz
-67.02 dBm
Norm
Log
10
dB/
LgAv
W1 S2
S3 FC
AA
£(f):
f>50k
Swp
Center 3.685 60 GHz
Res BW 91 kHz
VBW 91 kHz
Span 10 MHz
Sweep 1.48 ms (601 pts)
Center Freq
3.68560000 GHz
Start Freq
3.68060000 GHz
Stop Freq
3.69060000 GHz
CF Step
1.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off

Fig.2

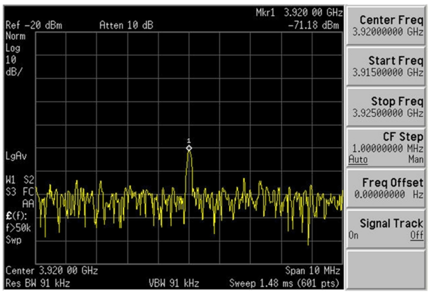

Ref -20 dBm
Atten 10 dB
Mkr1 3.920 00 GHz
-71.18 dBm
Norm
Log
10
dB/
LgAv
W1 S2
S3 FC
AA
£(f):
f>50k
Swp
Center 3.920 00 GHz
Res BW 91 kHz
VBW 91 kHz
Span 10 MHz
Sweep 1.48 ms (601 pts)
Center Freq
3.92000000 GHz
Start Freq
3.91500000 GHz
Stop Freq
3.92500000 GHz
CF Step
1.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off

Fig.3

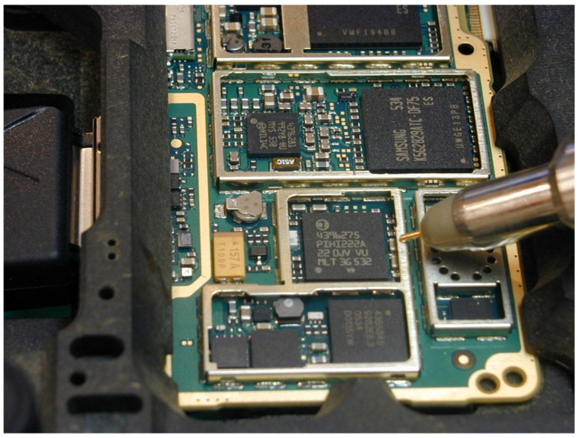


Fig.4

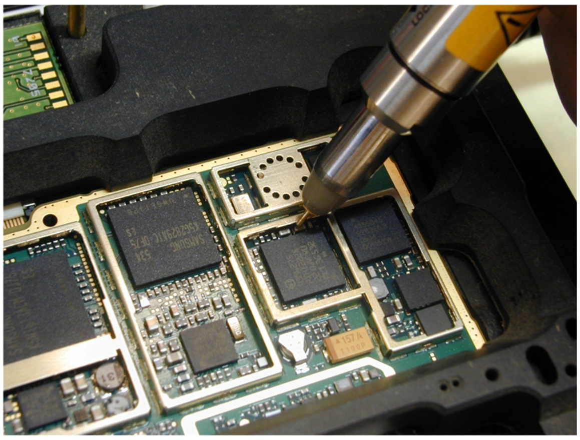


Fig.5

Synthesizer test points

Measure	RF ASIC N7501	Expected Result
VCTXCO output voltage	G7501 pin 3	38.4MHz 800 mVpp
RFCLKEXT		38.4MHz 500 mVpp
VCTXCO AFC voltage	C7518	1V

Measure	RF ASIC N7501
VCO	G7502 (on the wall of N7501 shield can)

Receiver troubleshooting

Introduction to Rx troubleshooting

Rx can be tested by making a phone call or in the local mode. For the local mode testing, use Phoenix service software.

The primary Rx troubleshooting parameter RSSI (Receiving Signal Strength Indicator). For GSM RSSI measurement, see GSM Rx chain activation for manual measurements / GSM RSSI measurement (page 7–13), and for the same measurement in WCDMA, see WCDMA RSSI measurement (page 7–15).

In GSM, the input signal can be either a real GSM signal or a CW (Continuous Wave) signal, which is 67.771 kHz above the carrier frequency.

In WCDMA, the input signal can be either a real WCDMA signal or a CW signal, which is 1 MHz above the carrier frequency.

For service tool usage instructions, refer to section **Service Tools and Service Concepts**.

Related information

- WCDMA Rx chain activation for manual measurement (page 7–14)

GSM Rx chain activation for manual measurements / GSM RSSI measurement

Context

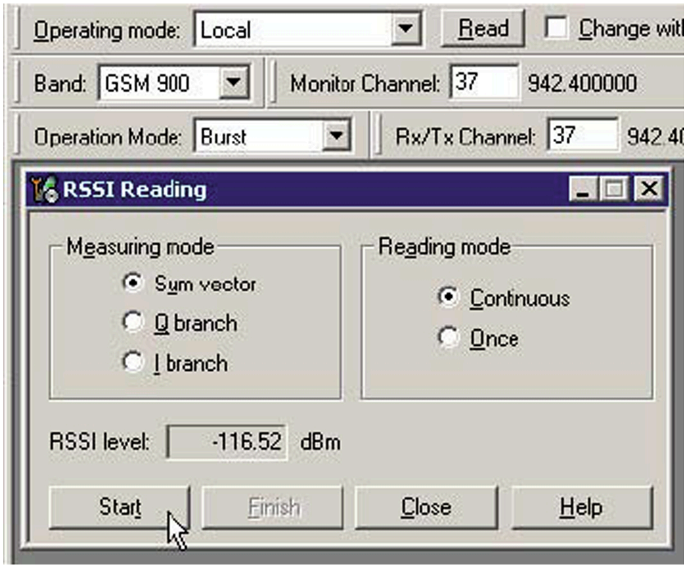
RSSI signal measurement is the main Rx troubleshooting measurement. The test measures the strength of the received signal.

I and Q branches can be measured separately. In GSM, the input signal can be either real GSM signal or a CW (Continuous Wave) signal that is 67.771 kHz above the carrier frequency.

Steps

1. Start *Phoenix* service software.
2. Choose **Testing**→**GSM**→**RSSI Reading** .
3. Set the RF signal generator for channel frequency +67.771 kHz CW mode with –80 dBm signal.

   Alternatively set the cellular tester downlink channel to the appropriate channel. Make sure that the tester is set to continuous mode, not to burst mode.
4. In the *RSSI Reading* window, select the appropriate band and channel.



Operating mode: Local
Band: GSM 900
Monitor Channel: 37 942.400000
Operation Mode: Burst
Rx/Tx Channel: 37 942.4

RSSI Reading
Measuring mode: ● Sum vector ○ Q branch ○ I branch
Reading mode: ● Continuous ○ Once
RSSI level: -116.52 dBm

Figure 54 ***RSSI Reading*** **window**

5. To start the measurement, activate GSM Rx chain, click **Start**.

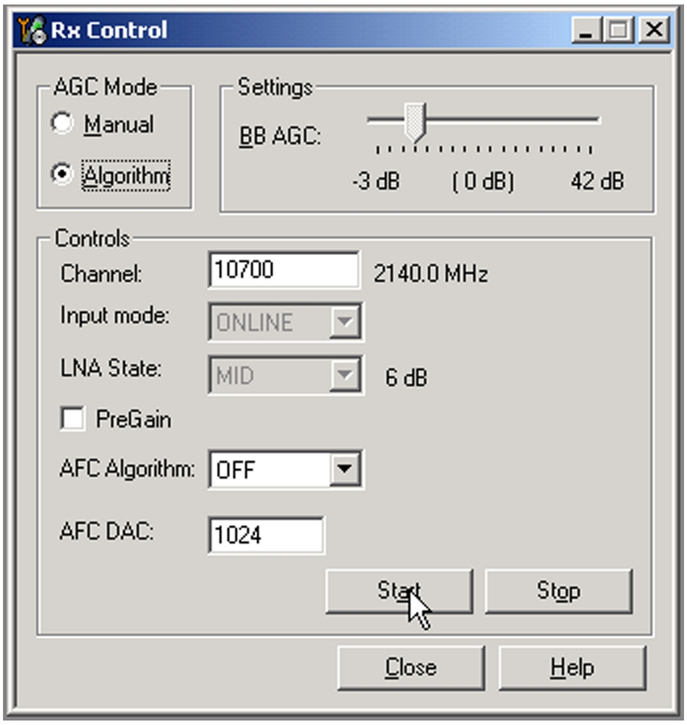
Results

RSSI reading values of the selected band and channel are displayed. The RSSI level must be the same value which is set at the signal generator (-80 dBm).

WCDMA Rx chain activation for manual measurement

Steps

1. Start *Phoenix* service software.
2. Choose **Testing**→**WCDMA**→**Rx Control** .
3. In the *Rx Control* window:



Rx Control

AGC Mode
○ Manual
● Algorithm

Settings
BB AGC: -3 dB (0 dB) 42 dB

Controls
Channel: 10700 2140.0 MHz
Input mode: ONLINE
LNA State: MID 6 dB
☐ PreGain
AFC Algorithm: OFF
AFC DAC: 1024

Figure 55 *Rx Control* window

- Set **AGC Mode** to **Algorithm**.
- Set **Channel** to **10700**.
- Set **AFC Algorithm** to **OFF** (Default = **OFF**).

Next actions

When settings are ready, click **Start** to activate them.

If settings are changed later on (for example, you give a new channel number), you will need to click **Stop** and **Start** again.

Note: Clicking **Stop** also disables **Tx Control** if that was active!

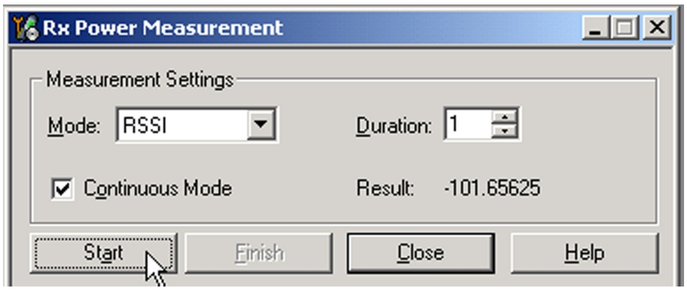
WCDMA RSSI measurement

Prerequisites

WCDMA Rx must be activated before RSSI can be measured. See WCDMA Rx chain activation for manual measurement (page 7–14).

Steps

1. Start *Phoenix* service software.
2. Choose **Testing→WCDMA→Rx Power Measurement** .
3. In the *Rx Power Measurement* window, choose the following settings:
   - Mode: RSSI
   - Continuous Mode



Rx Power Measurement
Measurement Settings
Start
Finish
Close
Help

Mode: RSSI

Duration: 1

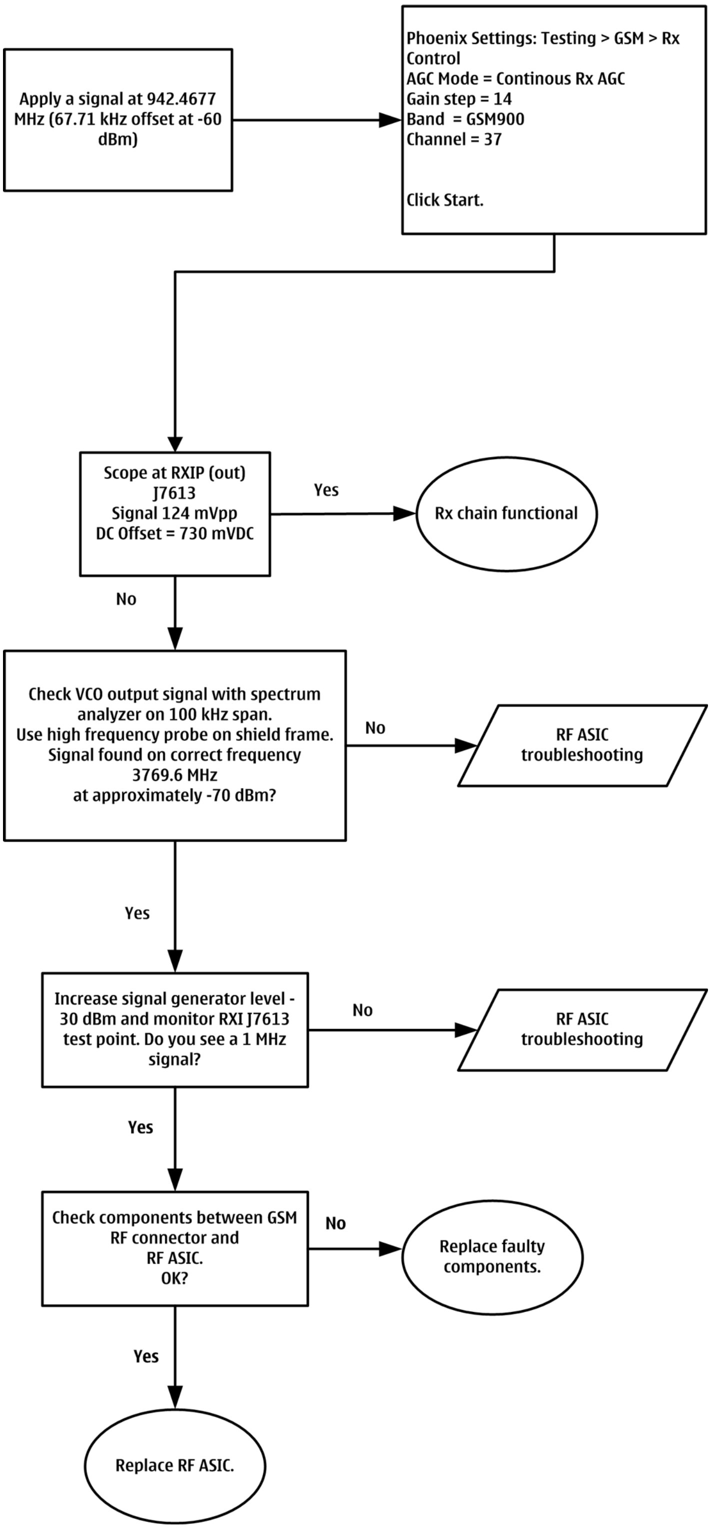
☑ Continuous Mode

Result: -101.65625

4. To perform the measurement, click **Start**.

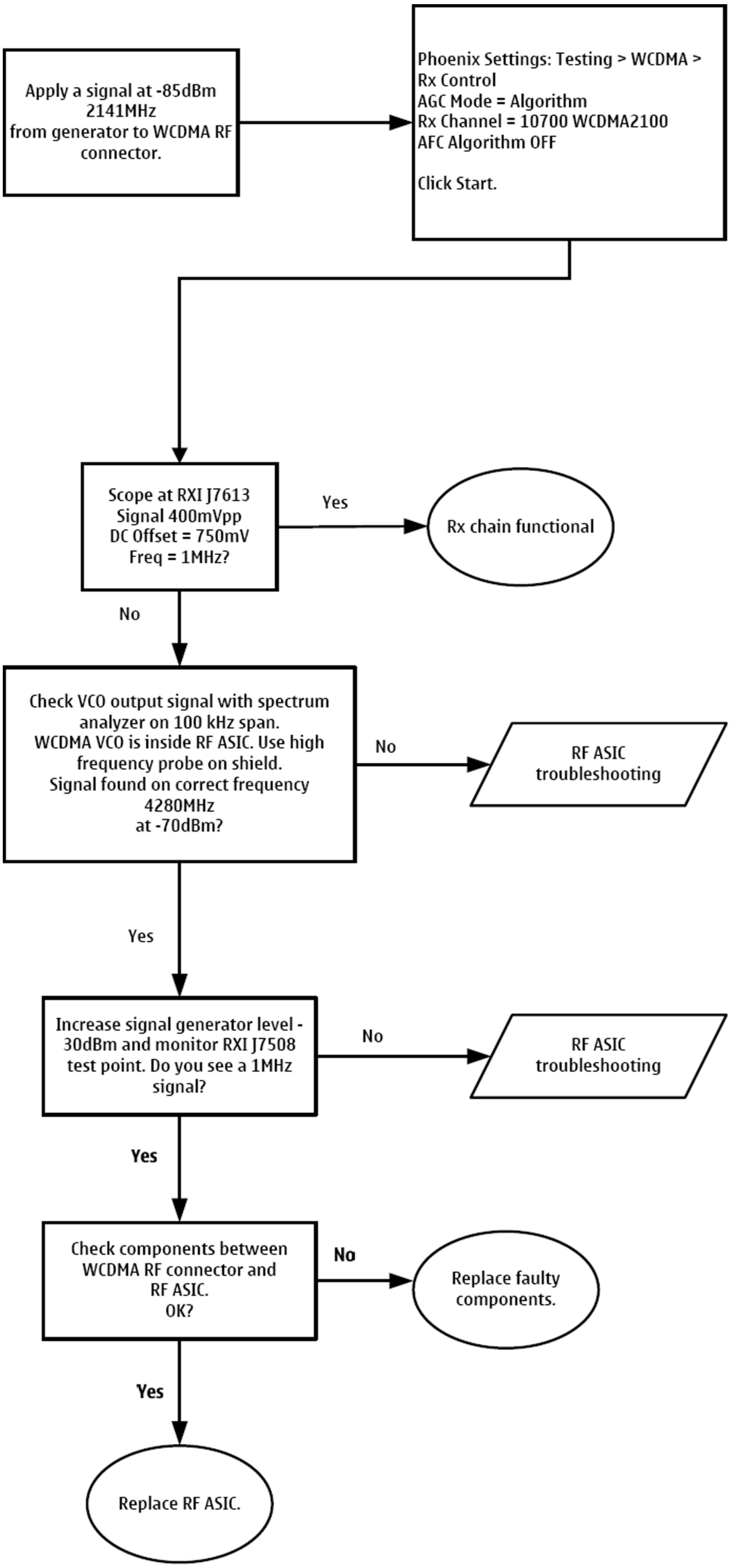
GSM receiver troubleshooting

Troubleshooting flow


Apply a signal at 942.4677 MHz (67.71 kHz offset at -60 dBm)
Phoenix Settings: Testing > GSM > Rx Control
AGC Mode = Continous Rx AGC
Gain step = 14
Band = GSM900
Channel = 37
Click Start.
Scope at RXIP (out) J7613
Signal 124 mVpp
DC Offset = 730 mVDC
Yes
Rx chain functional
No
Check VCO output signal with spectrum analyzer on 100 kHz span.
Use high frequency probe on shield frame.
Signal found on correct frequency 3769.6 MHz
at approximately -70 dBm?
No
RF ASIC troubleshooting
Yes
Increase signal generator level -30 dBm and monitor RXI J7613 test point. Do you see a 1 MHz signal?
No
RF ASIC troubleshooting
Yes
Check components between GSM RF connector and RF ASIC.
OK?
No
Replace faulty components.
Yes
Replace RF ASIC.

WCDMA receiver troubleshooting

Troubleshooting flow


Apply a signal at -85dBm
2141MHz
from generator to WCDMA RF connector.
Phoenix Settings: Testing > WCDMA >
Rx Control
AGC Mode = Algorithm
Rx Channel = 10700 WCDMA2100
AFC Algorithm OFF
Click Start.
Scope at RXI J7613
Signal 400mVpp
DC Offset = 750mV
Freq = 1MHz?
Yes
Rx chain functional
No
Check VCO output signal with spectrum analyzer on 100 kHz span.
WCDMA VCO is inside RF ASIC. Use high frequency probe on shield.
Signal found on correct frequency
4280MHz
at -70dBm?
No
RF ASIC troubleshooting
Yes
Increase signal generator level -30dBm and monitor RXI J7508 test point. Do you see a 1MHz signal?
No
RF ASIC troubleshooting
Yes
Check components between WCDMA RF connector and RF ASIC.
OK?
No
Replace faulty components.
Yes
Replace RF ASIC.

Receiver test points

Measure	RF ASIC N7501	Expected Result
RXIP	J7613	400 mVpp and 750 mVDC
RXIN	J7614	400 mVpp and 750 mVDC
RXQP	J7615	400 mVpp and 750 mVDC
RXQN	J7616	400 mVpp and 750 mVDC

Band	RF ASIC N7501	Expected Result
GSM900	No test point	942.46771 MHz at -50 dBm
GSM1800	C7662	1842.86771 MHz at -50 dBm
GSM1900	C7661	1960.06771 MHz at -50 dBm

Transmitter troubleshooting

General instructions for Tx troubleshooting

Context

- Tx troubleshooting requires Tx operation.
- Do not transmit on frequencies that are in use.
- Transmitter can be controlled in the local mode for diagnostic purposes.
- The best diagnostic tool for GSM transmitter testing is **RF Controls**, and for the WCDMA transmitter testing **Tx Control**.

  Tx IQ tuning and Tx power tuning can be also used in some cases.
- Remember that retuning is not a repair procedure.

The first set of steps instructs how to assemble the test setup. This setup is general for all Tx troubleshooting tasks.

Alternative steps provide specific troubleshooting instructions for *Phoenix* service software. The first section is for the EGSM900/GSM1800/GSM1900 bands and the latter for WCDMA.

Caution: Never activate the GSM or WCDMA transmitter without a proper antenna load. There should be always 50 ohm load connected to the RF connector (antenna, RF-measurement equipment or at least 2 watts dummy load), otherwise GSM or WCDMA PA may be damaged.

Steps

1. Connect a module jig to a computer with a DAU-9S cable or to a FPS-10 flash prommer with a modular cable.

   Make sure that you have a PKD-1 dongle connected to the computer parallel port.
2. Connect a DC power supply to a product-specific module jig.

   Note: When repairing or tuning a transmitter, use an external DC supply with at least 3 A current capability.

   Set the DC supply voltage to 3.9 V.
3. Connect an RF cable between the RF connector of the product-specific module test jig and measurement equipment or alternatively use a 50 ohms (at least 2 W) dummy load in the module test jig RF connector; otherwise GSM or WCDMA PA may be damaged.

   Note: There are three antenna connectors in the module jig:
   - one for GSM
   - one for WCDMA
   - one for Bluetooth and WLAN* (* = if applicable)

   Make sure that all connections are made to the correct RF connector.

   Normally a spectrum analyser is used as measurement equipment.

   Note: The maximum input power of a spectrum analyser is +30 dBm.

   To prevent any damage, it is recommended to use 10 dB attenuator on the spectrum analyzer input.
4. Set Tx on.

   i Place the phone module to the test jig and start *Phoenix* service software.

   ii Initialize connection to the phone (with FPS-10 use FBUS when using a DAU-9S cable and a COMBOX driver).

   iii Choose **File→Open Product→xx-x*** (* = type designator of the phone) or **File→Scan Product.** .

   iv From the toolbar, set **Operating mode** to **Local.**

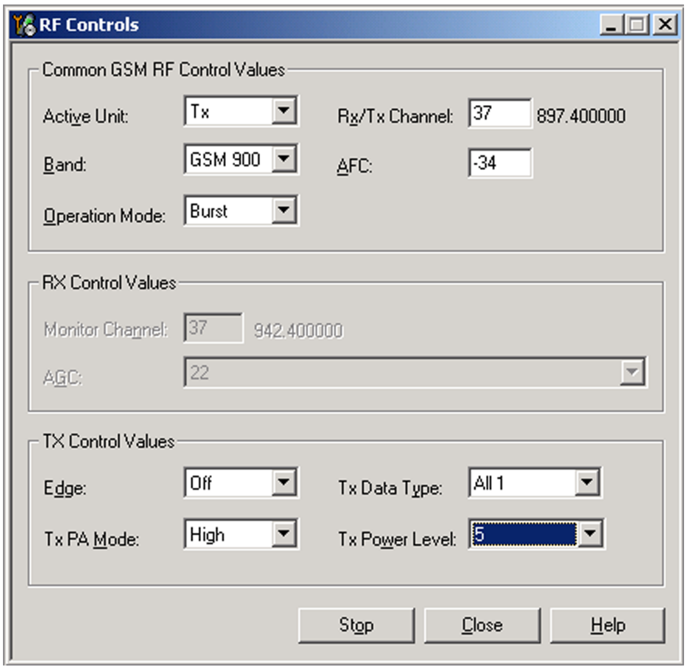
Alternative steps

- EGSM900/GSM1800/GSM1900 troubleshooting

  i Choose **Testing→GSM→RF Controls.**

  ii In the *RF Controls* window:
  - Choose **Band**: **GSM900** or **GSM1800** or **GSM1900** (Default = **GSM900**).
  - Set **Rx/Tx channel** in the following way:
    - GSM900: **37**
    - GSM1800: **700**
    - GSM1900: **661**
  - Set **Active unit** to **Tx** (Default = **Rx**).
  - Set **Operation Mode** to **Burst** (Default = **Burst**).
  - Set **Edge** to **Off** (Default).
  - Set **Tx Data Type** to **All 1** (Default = **All 1**).

    - Set **Tx PA Mode** to **High** (Default).
    - Set **Tx Power Level** in the following way:
        - GSM900: **5** (Default = **19**)
        - GSM1800: **0** (Default = **15**)
        - GSM1900: **0** (Default = **15**)



RF Controls

Common GSM RF Control Values

Active Unit: Tx

Rx/Tx Channel: 37 897.400000

Band: GSM 900

AFC: -34

Operation Mode: Burst

RX Control Values

Monitor Channel: 37 942.400000

AGC: 22

TX Control Values

Edge: Off

Tx Data Type: All 1

Tx PA Mode: High

Tx Power Level: 5

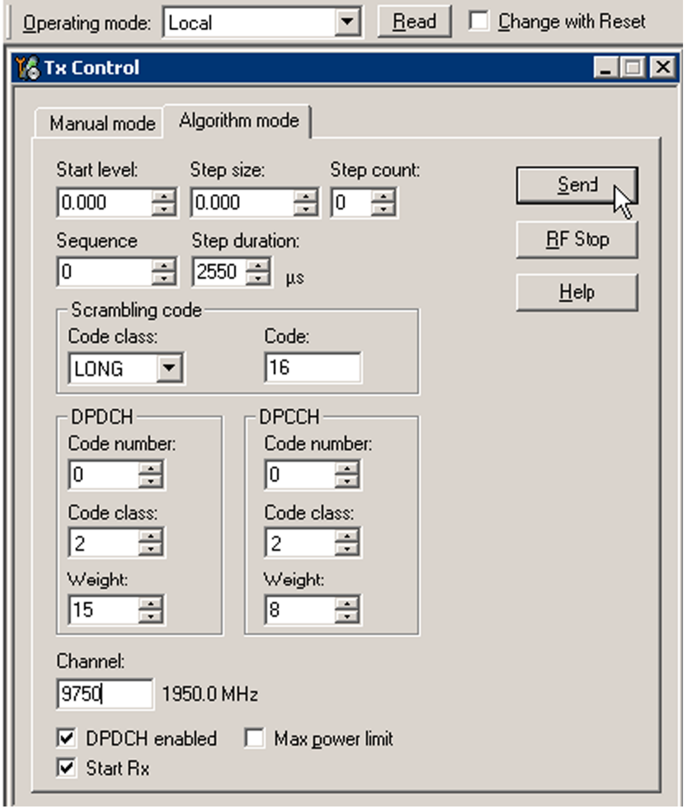
Figure 56 *RF Controls* window

- WCDMA troubleshooting

  i Choose **Testing→WCDMA→Tx Control.**

  ii In the *Tx Control* window:

    - Select the **Algorithm mode** tab.
    - Set **Start level** to **0** dBm (Default = **0**).
    - Set **Step size**, **Step count** and **Sequence** to **0** (Default = **0**).
    - In the **Scrambling code** pane set **Code class** to **LONG** (Default = **LONG**), and **Code** to **16** (Default = **16**).
    - For **DPDCH** set the following values:
        - **Code number**: **0**
        - **Code class**: **2**
        - **Weight**: **15**
    - For **DPCCH** set the following values:
        - **Code number**: **0**
        - **Code class**: **2**
        - **Weight**: **8**
    - Set **Channel** to **9750**.
    - Check the **DPDCH enabled** check box (Default).


Tx Control
Manual mode
Algorithm mode
Read
Send
RF Stop
Help
Scrambling code
DPDCH
DPCCH

Operating mode: Local

☐ Change with Reset

Start level: 0.000

Step size: 0.000

Step count: 0

Sequence: 0

Step duration: 2550 µs

Scrambling code

Code class: LONG

Code: 16

DPDCH

Code number: 0

Code class: 2

Weight: 15

DPCCH

Code number: 0

Code class: 2

Weight: 8

Channel: 9750 1950.0 MHz

☑ DPDCH enabled ☐ Max power limit

☑ Start Rx

Figure 57 ***Tx Control*** **window**

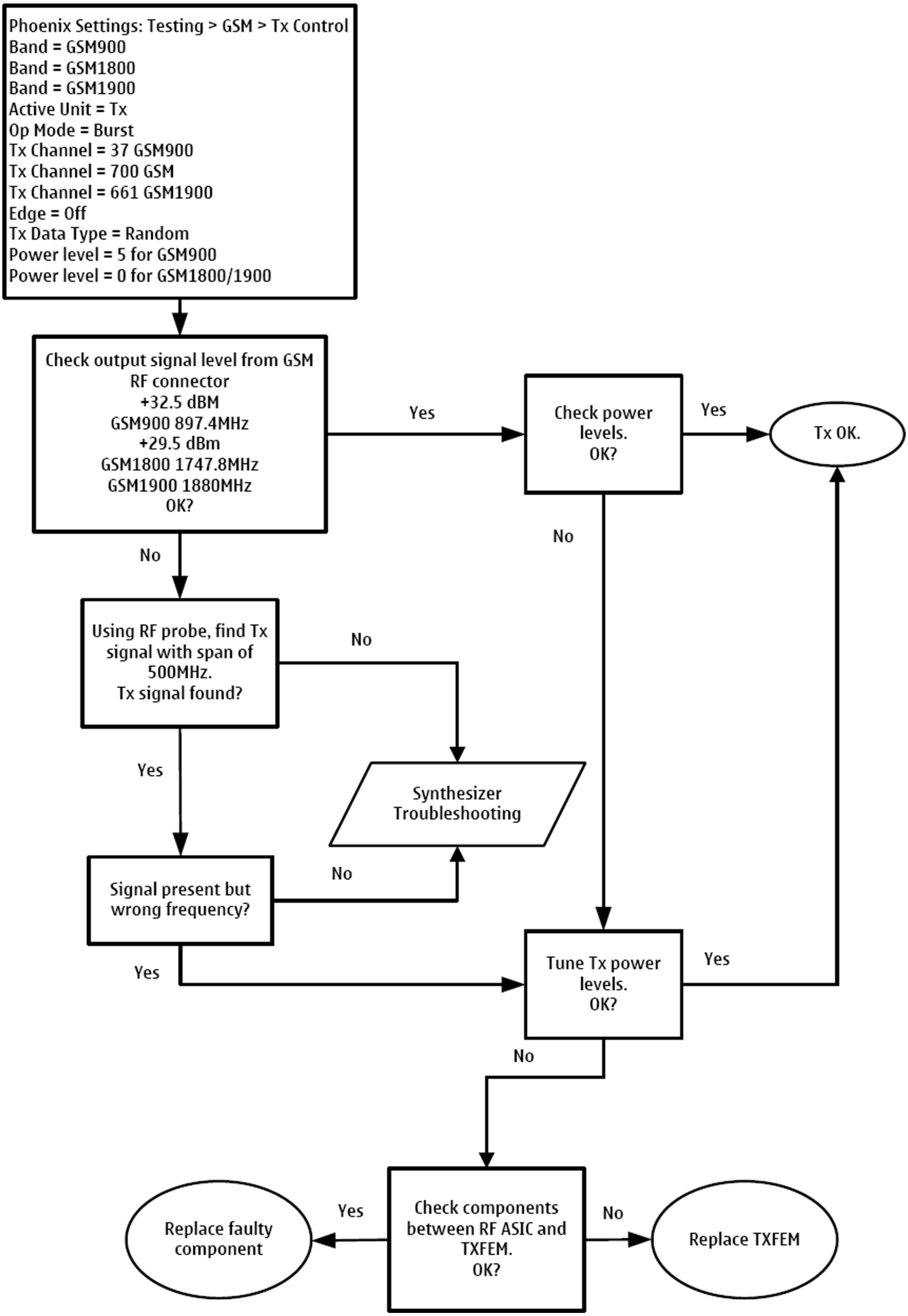
Next actions

When settings are done, click **Send** to enable them.

If you change the settings (e.g. give a new channel number), you need to click **Stop** and **Send** again.

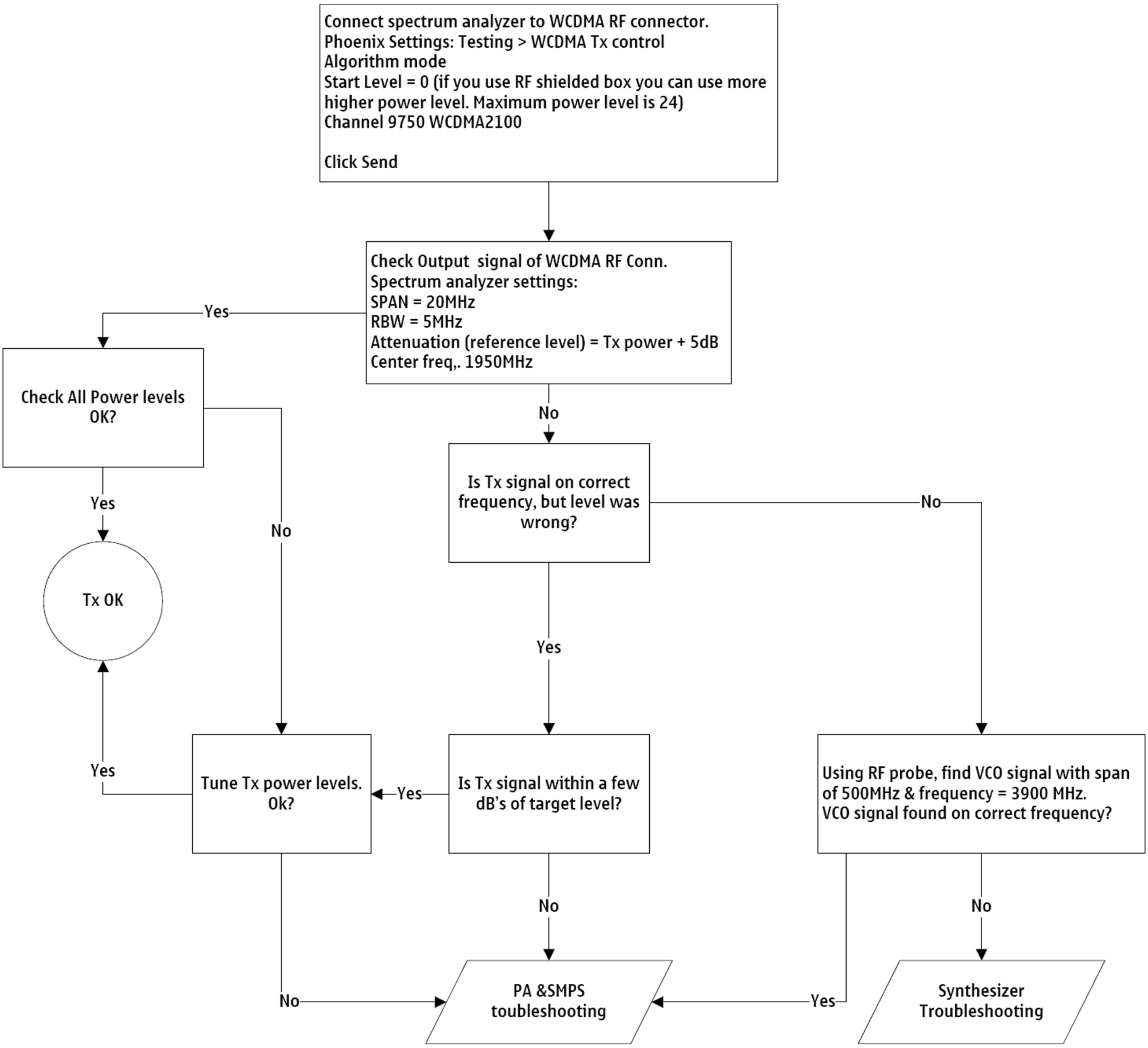
GSM transmitter troubleshooting

Troubleshooting flow


Phoenix Settings: Testing > GSM > Tx Control
Band = GSM900
Band = GSM1800
Band = GSM1900
Active Unit = Tx
Op Mode = Burst
Tx Channel = 37 GSM900
Tx Channel = 700 GSM
Tx Channel = 661 GSM1900
Edge = Off
Tx Data Type = Random
Power level = 5 for GSM900
Power level = 0 for GSM1800/1900
Check output signal level from GSM RF connector +32.5 dBM GSM900 897.4MHz +29.5 dBm GSM1800 1747.8MHz GSM1900 1880MHz OK?
Yes
Check power levels. OK?
Yes
Tx OK.
No
No
Using RF probe, find Tx signal with span of 500MHz. Tx signal found?
No
Yes
Synthesizer Troubleshooting
Signal present but wrong frequency?
No
Yes
Tune Tx power levels. OK?
Yes
No
Replace faulty component
Yes
Check components between RF ASIC and TXFEM. OK?
No
Replace TXFEM

WCDMA transmitter troubleshooting

Troubleshooting flow


Connect spectrum analyzer to WCDMA RF connector.
Phoenix Settings: Testing > WCDMA Tx control
Algorithm mode
Start Level = 0 (if you use RF shielded box you can use more higher power level. Maximum power level is 24)
Channel 9750 WCDMA2100
Click Send
Check Output signal of WCDMA RF Conn.
Spectrum analyzer settings:
SPAN = 20MHz
RBW = 5MHz
Attenuation (reference level) = Tx power + 5dB
Center freq,. 1950MHz
Yes
Check All Power levels OK?
No
Yes
Tx OK
No
Is Tx signal on correct frequency, but level was wrong?
No
Yes
Tune Tx power levels. Ok?
Yes
Yes
Is Tx signal within a few dB's of target level?
Using RF probe, find VCO signal with span of 500MHz & frequency = 3900 MHz.
VCO signal found on correct frequency?
No
No
No
PA &SMPS toubleshooting
Yes
Synthesizer Troubleshooting

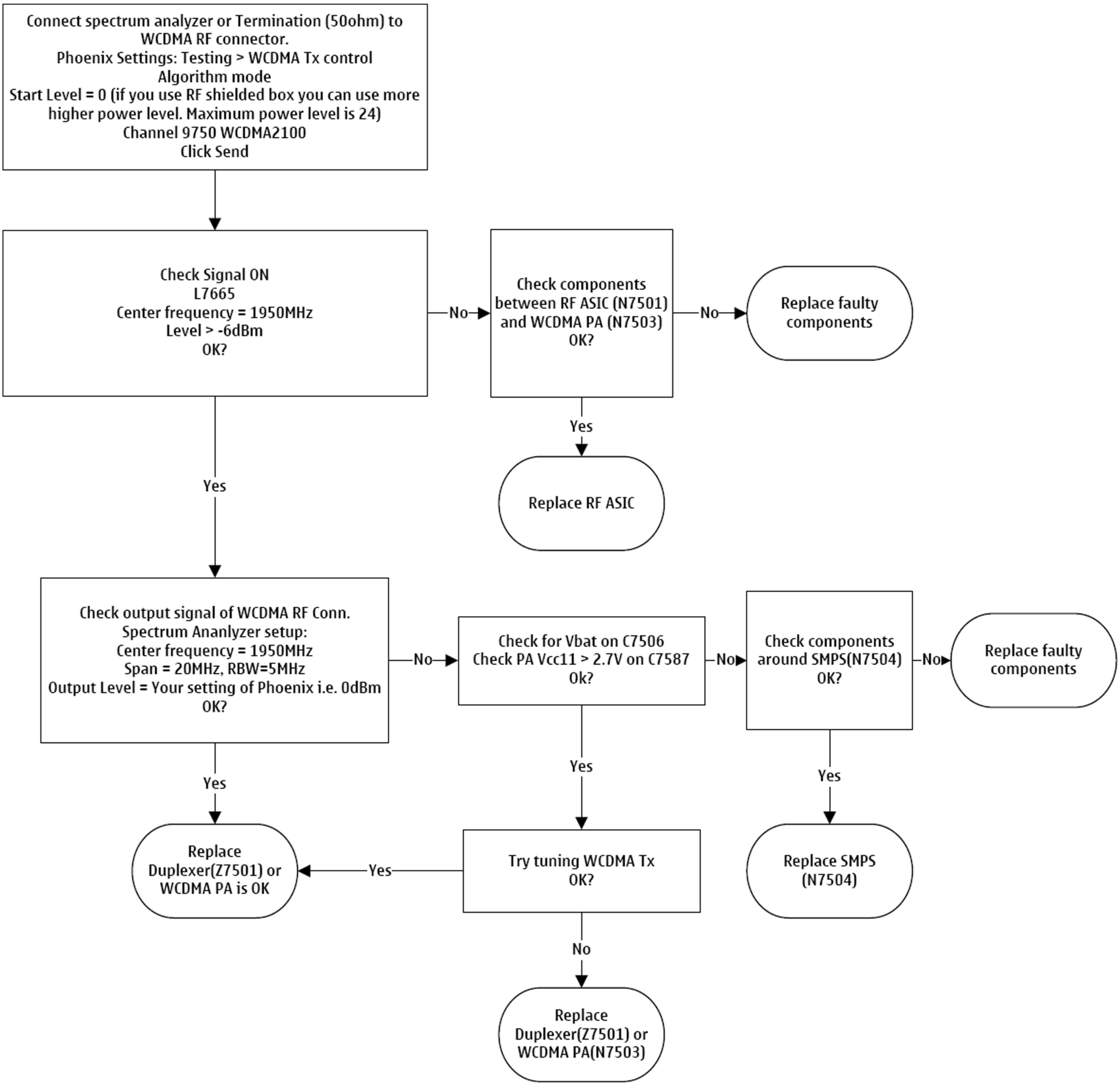
Transmitter test points for GSM

Band	RF ASIC N7501	Expected Result
GSM900	No test point	897.4 MHz
GSM1800	R7685	1747.8 MHz

Band	RF ASIC N7501	Expected Result
GSM1900	R7685	1880.0 MHz

Power amplifier (PA) and switch mode power supply (SMPS) troubleshooting

Troubleshooting flow


Connect spectrum analyzer or Termination (50ohm) to WCDMA RF connector.
Phoenix Settings: Testing > WCDMA Tx control
Algorithm mode
Start Level = 0 (if you use RF shielded box you can use more higher power level. Maximum power level is 24)
Channel 9750 WCDMA2100
Click Send
Check Signal ON
L7665
Center frequency = 1950MHz
Level > -6dBm
OK?
No
Check components between RF ASIC (N7501) and WCDMA PA (N7503) OK?
No
Replace faulty components
Yes
Replace RF ASIC
Yes
Check output signal of WCDMA RF Conn.
Spectrum Ananlyzer setup:
Center frequency = 1950MHz
Span = 20MHz, RBW=5MHz
Output Level = Your setting of Phoenix i.e. 0dBm
OK?
No
Check for Vbat on C7506
Check PA Vcc11 > 2.7V on C7587
OK?
No
Check components around SMPS(N7504) OK?
No
Replace faulty components
Yes
Replace SMPS (N7504)
Yes
Try tuning WCDMA Tx
OK?
Yes
Replace Duplexer(Z7501) or WCDMA PA is OK
Yes
No
Replace Duplexer(Z7501) or WCDMA PA(N7503)

■ RF tunings

Introduction to RF tunings

Only perform RF tunings if:

- one or more of the RF components is changed
- A flash memory chip is changed* (*if allowed) or otherwise corrupted.

> **Caution:** RF calibration is always performed with the help of a product-specific module jig, never with an RF coupler. Using an RF coupler in the calibration phase results in a complete mistuning of the RF side.
>
> **Important:** After RF component changes, **always** use autotuning. Manual tunings are only required in rare cases.

Cable and adapter losses

RF cables and adapters have some losses. They have to be taken into account when the phone is tuned. As all the RF losses are frequency dependent, you have to be very careful and understand the measurement setup. For attenuation values, see section Service Tools and Service Concepts.

RF autotuning

Prerequisites

For information on the recommended test set-up, refer to the corresponding information on the Partner Website or Nokia Online.

Before you can use the autotuning feature, the GPIB driver from the GPIB card vendor must be installed and running.

The autotune **.xml** file must be in a correct place: **C:\Program Files\Nokia\Phoenix\products\xx-x*\rfconf_xx-x*.xml** (**= indicates the type designator of the phone, e.g. RM-1*)

Context

RF autotuning is performed with the aid of a digital radio communication tester.

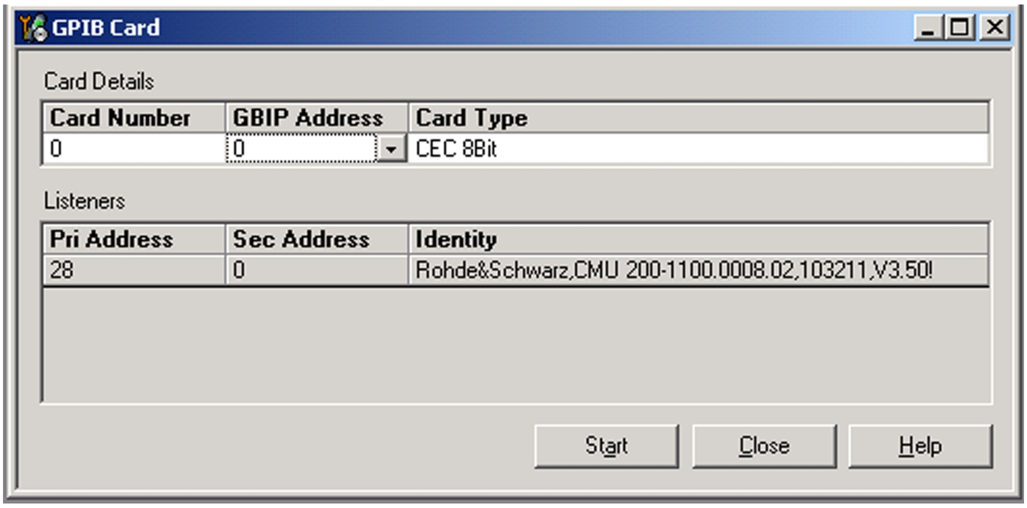
Autotuning covers all RF tunings that are needed to perform after RF component repairs.

> **Note:** Do not perform RF autotuning without a proper reason. Autotuning may only be performed after component repairs or if the RF tuning information is lost.

Steps

1. Connect the communication tester to the GPIB bus.
2. Start *Phoenix* service software.
3. Choose **Tools→Options→GPIB Card.**
4. From the **Card Type** drop-down menu, choose the GPIB card used, then click **Start**.

   The name of the communication tester appears in the **Listeners** pane.



Card Details

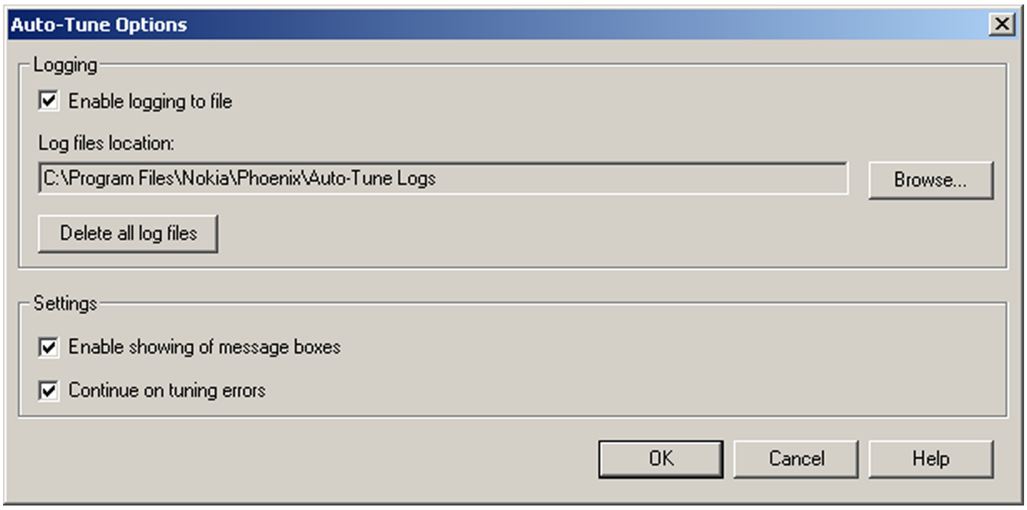
Card Number	GBIP Address	Card Type
0	0	CEC 8Bit

Listeners

Pri Address	Sec Address	Identity
28	0	Rohde&Schwarz,CMU 200-1100.0008.02,103211,V3.50!

5. To specify the cable loss from a module jig to the communication tester, choose **Set Loss** from the **Tuning** menu.
6. In the *Set Loss* window, click the **Jig** tab, and select the right jig for the phone from the drop-down list.

   Alternatively, you can add a new jig by clicking **Add**, and selecting the desired jig from the list.
7. Click the **Cable** tab and add the extra cable attenuation.
8. To start autotuning, choose **Auto-Tune** from the **Tuning** menu.
9. In the *Auto-Tune* window, click **Options**.
10. In the *Auto-Tune options* window, ensure the **Enable showing of message boxes** check box is checked, and click **OK**.



Logging

☑ Enable logging to file

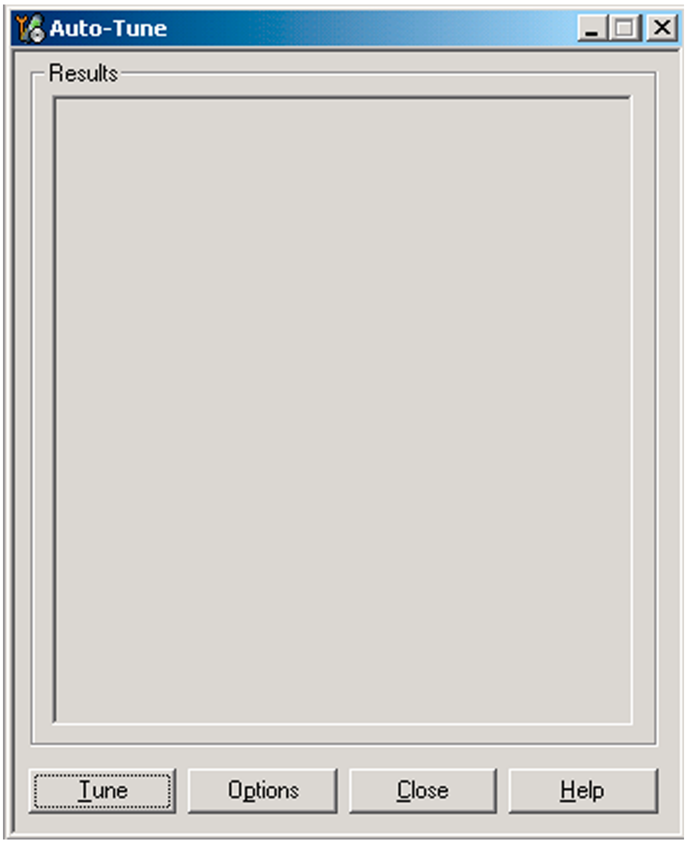
Log files location: C:\Program Files\Nokia\Phoenix\Auto-Tune Logs

Settings

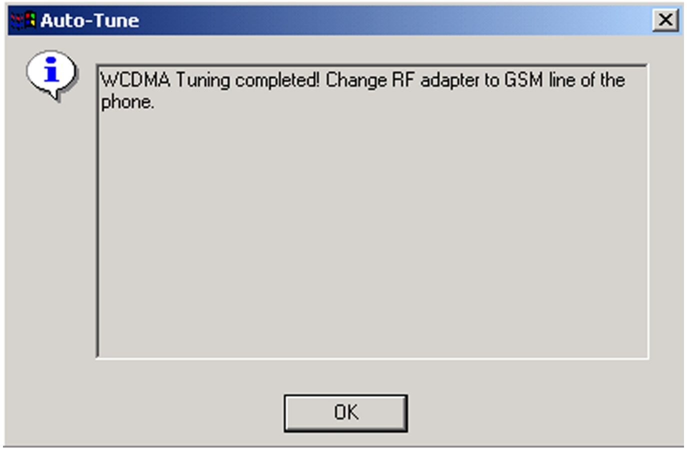
☑ Enable showing of message boxes

☑ Continue on tuning errors

11. Connect the phone WCDMA RF port to the communication tester, and click **Tune**.


Auto-Tune
Results
Tune
Options
Close
Help

12. Change the phone RF adapter from WCDMA port to GSM port.

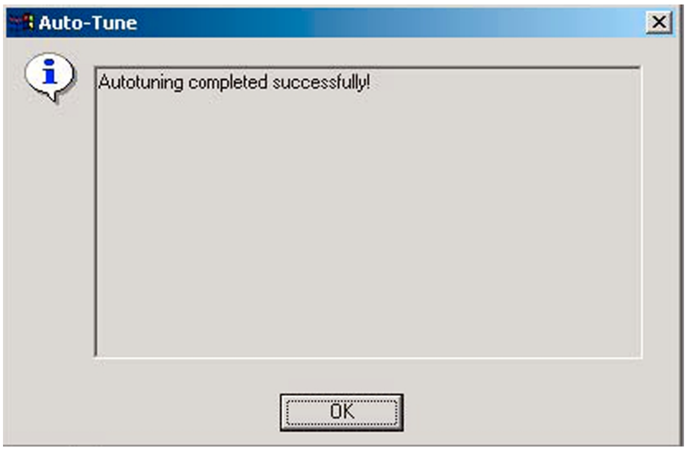

Auto-Tune
OK

WCDMA Tuning completed! Change RF adapter to GSM line of the phone.

13. To complete the RF autotuning, click **OK**.

Results

Autotuning completed successfully! message appears.



Autotuning completed successfully!

RF manual tuning guide

Required manual tunings after component changes

Important: After RF component changes, **always** use autotuning. Manual tunings are only required in rare cases.

If, however, manual tuning is used, only relevant tunings should be performed. Refer to the following table:

Changed component	Perform the following tunings
Tx RF ASIC	RF Channel Filter Calibration, Tx IQ Tuning, Tx Power Level Tuning, Temperature Sensor Calibration, TX AGC & Power Detector, Tx Band Response Calibration, Tx LO Leakage
Rx RF ASIC	RF Channel Filter Calibration, Rx Calibration, Rx Band Filter Response Compensation, Rx AGC Alignment, Rx Band Response Calibration
Any component in the GSM Tx RF chain before the PA	Tx IQ Tuning, Tx Power Level Tuning
Any component in the GSM Tx RF chain after the PA or PA	Tx Power Level Tuning
Any component in the WCDMA Tx RF chain before the PA	Tx AGC & Power Detector, Tx Band Response Calibration, Tx LO Leakage
Any component in the WCDMA Tx or Rx chain after the PA, power detector or PA switch mode power supply	Tx AGC & Power Detector, Tx Band Response Calibration, PA Detection
Any component in the GSM Rx chain	Rx Calibration, RX Band Filter Response Compensation
Any component in the WCDMA Rx chain	Rx AGC Alignment, RX Band Response Calibration
VCTCXO	Rx Calibration (GSM850/GSM900 band)

System mode independent manual tunings

Rf channel filter calibration

Context

Rf channel filter calibration tunes the internal low pass filters of Rx and Tx ASICs that limit the bandwidth of BB IQ signals.

One common calibration is made for both GSM and WCDMA.

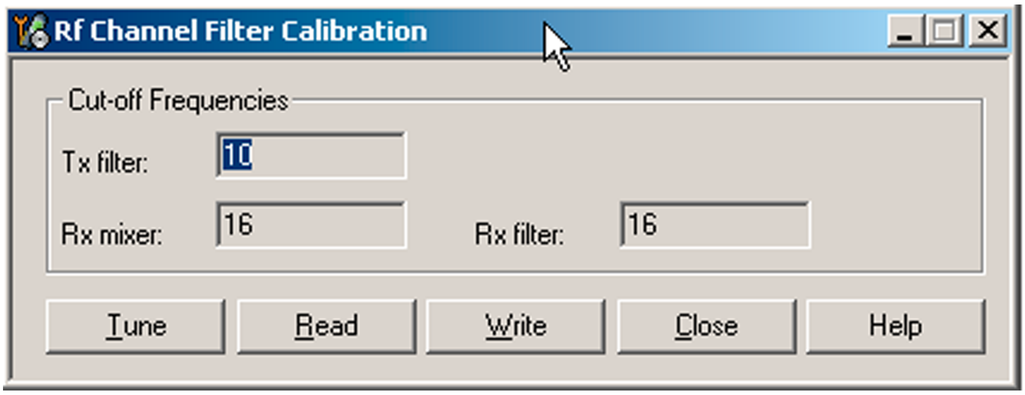
Table 16 Rf channel filter calibration tuning limits

	Min	Typ	Max
Tx filter	0	10	31
Rx filter	0	16	31

Steps

1. From the **Operating mode** drop-down menu, set mode to **Local**.
2. Choose **Tuning→Rf Channel Filter Calibration.**
3. Click **Tune**.
4. To save the values to the PMM (Phone Permanent Memory) area, click **Write**.
5. To end the tuning, click **Close**.

Results



Tx filter: 10
Rx mixer: 16
Rx filter: 16

Figure 58 Rf channel filter calibration typical values

PA (power amplifier) detection

Context

The PA detection procedure detects which PA manufacturer is used for phone PAs.

If a PA is changed or if the permanent memory (PMM) data is corrupted, PA detection has to be performed before Tx tunings.

Steps

1. From the **Operating mode** drop-down menu, set mode to **Local**.
2. Choose **Tuning→PA Detection** .

3. Click **Tune**.
4. Check that the detected PA manufacturers are corresponding to the actual chips on the board.
5. To end the procedure, click **Close**.

Temperature sensor calibration

Context

There is a temperature sensor integrated into one of the device ASICs. The ASIC provides DC-voltage, which is temperature dependent.

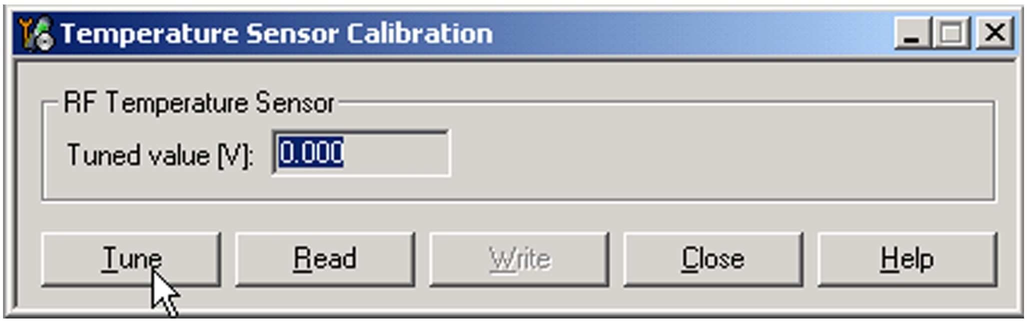
Temperature sensor calibration is done in room temperature, in which offset caused by the ASIC variation and AD-converter are nullified.

The module is able to do this calibration by itself, no external equipment is needed.

The temperature of the module and components must be 23 +/-2 degrees.

Steps

1. From the **Operating mode** drop-down menu, set mode to **Local**.
2. Choose **Tuning→Temperature Sensor Calibration** .
3. Click **Tune**.



Tuned value [V]: 0.000

Table 17 Temperature sensor calibration tuning limits

Min	Typ	Max	Unit
-20	-4	20	V

4. To save the calibration values, click **Write**.
5. To finish the calibration, click **Close**.

GSM receiver tunings

Rx calibration (GSM)

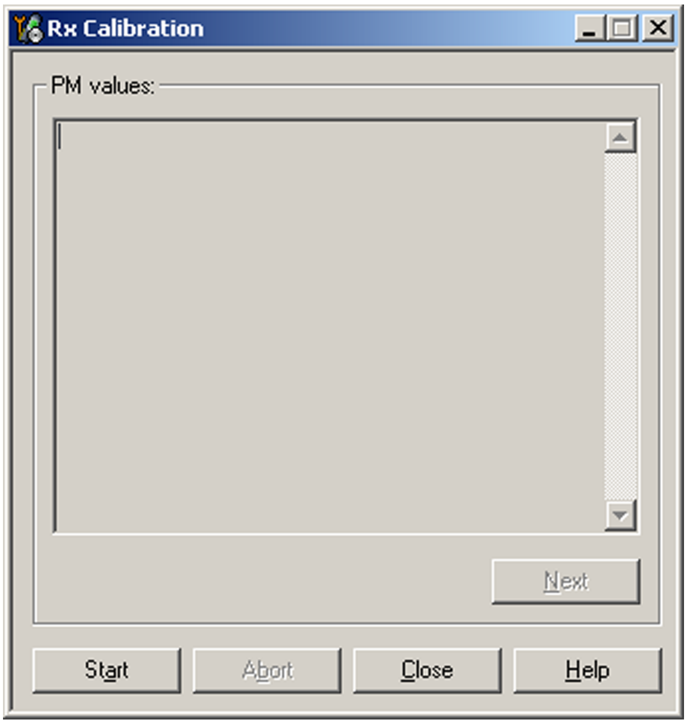
Context

Rx Calibration is used to find out the real gain values of the GSM Rx AGC system and tuning response of the AFC system (AFC D/A init value and AFC slope)

Steps

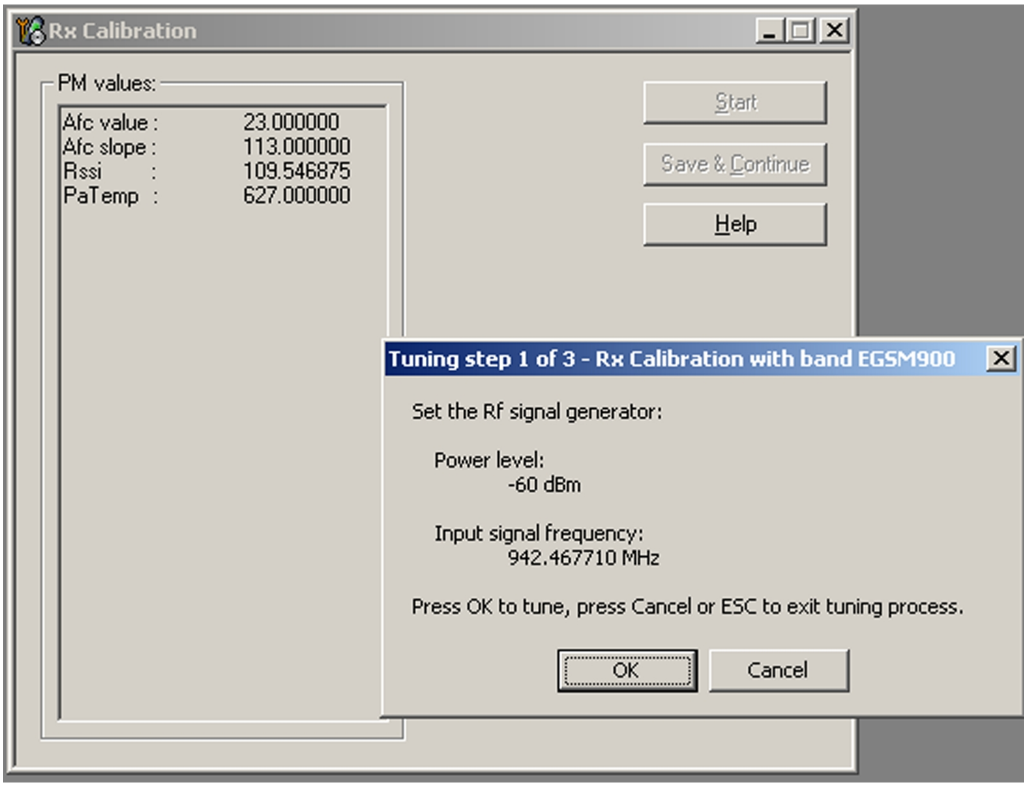
1. Connect the GSM connector of the module jig to a signal generator.
2. Start *Phoenix* service software.
3. Choose **File→Scan Product.**

4. From the **Operating mode** drop-down menu, set mode to **Local**.
5. Choose **Tuning→GSM→Rx Calibration.**
6. Click **Start**.



7. Connect the signal generator to the phone and set frequency and amplitude as instructed in the *Tuning step 1 of 3 - Rx Calibration with band EGSM900* pop-up window.

   Note: The calibration uses a non-modulated CW signal. Increase the signal generator level by cable attenuation and module jig probe attenuation!



PM values:

Afc value : 23.000000
Afc slope : 113.000000
Rssi : 109.546875
PaTemp : 627.000000

Tuning step 1 of 3 - Rx Calibration with band EGSM900

Set the Rf signal generator:

Power level:
-60 dBm

Input signal frequency:
942.467710 MHz

Press OK to tune, press Cancel or ESC to exit tuning process.

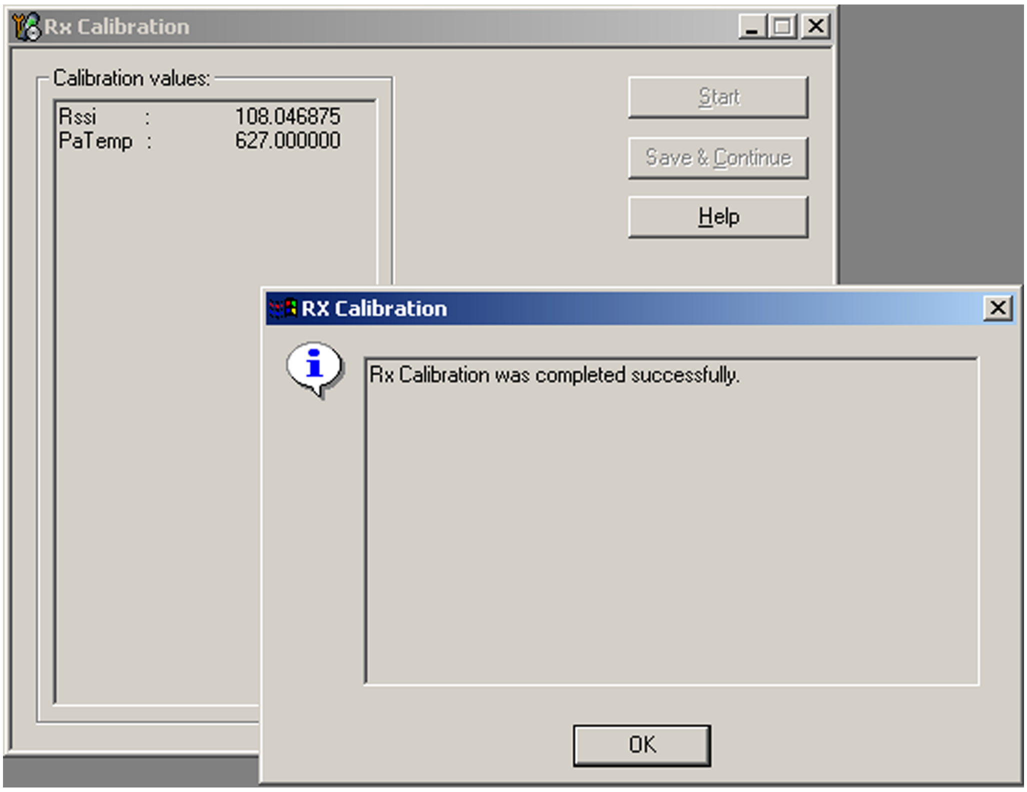
8. To perform the tuning, click **OK**.
9. Check that the tuning values are within the limits specified in the following table:

Table 18 RF tuning limits in Rx calibration

	Min	Typ	Max	Unit
GSM900				
AFC Value	-200	-105...62	200	
AFC slope	0	122	200	
RSSI0	106	107...110	114	dB
GSM1800				
RSSI0	104	104...109	114	dB
GSM1900				
RSSI0	104	104...109	114	dB

10. When the first values have been written to the phone memory, click **Next** to change to the next band.
11. To finish the tuning, go through all bands, and click **Close**.

Results



Rssi : 108.046875
PaTemp : 627.000000

Rx Calibration was completed successfully.

Rx band filter response compensation (GSM)

Prerequisites

Rx Calibration must be performed before the Rx Band Filter Response Compensation.

Context

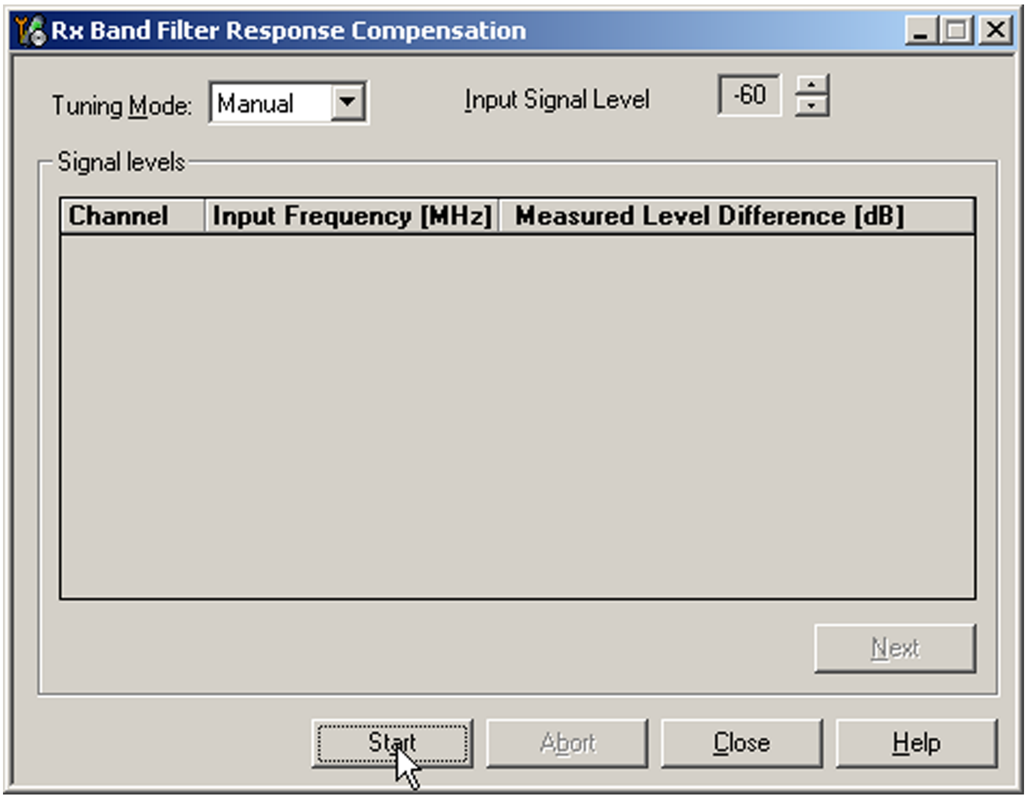
On each GSM Rx band, there is a band rejecting filter in front of an RF ASIC front end. The amplitude ripple caused by these filters causes ripple to the RSSI measurement and therefore calibration is needed.

The calibration has to be repeated for each GSM band.

Steps

1. Connect the GSM connector of the module jig to a signal generator.
2. Start *Phoenix* service software.
3. Choose **File Scan Product**.
4. From the **Operating mode** drop-down menu, set mode to **Local**.
5. Select **GSM900** band.
6. Choose **Tuning→GSM→Rx Band Filter Response Compensation.**
7. From the *Tuning mode* drop-down menu, select **Manual**.

8. Click **Start**.

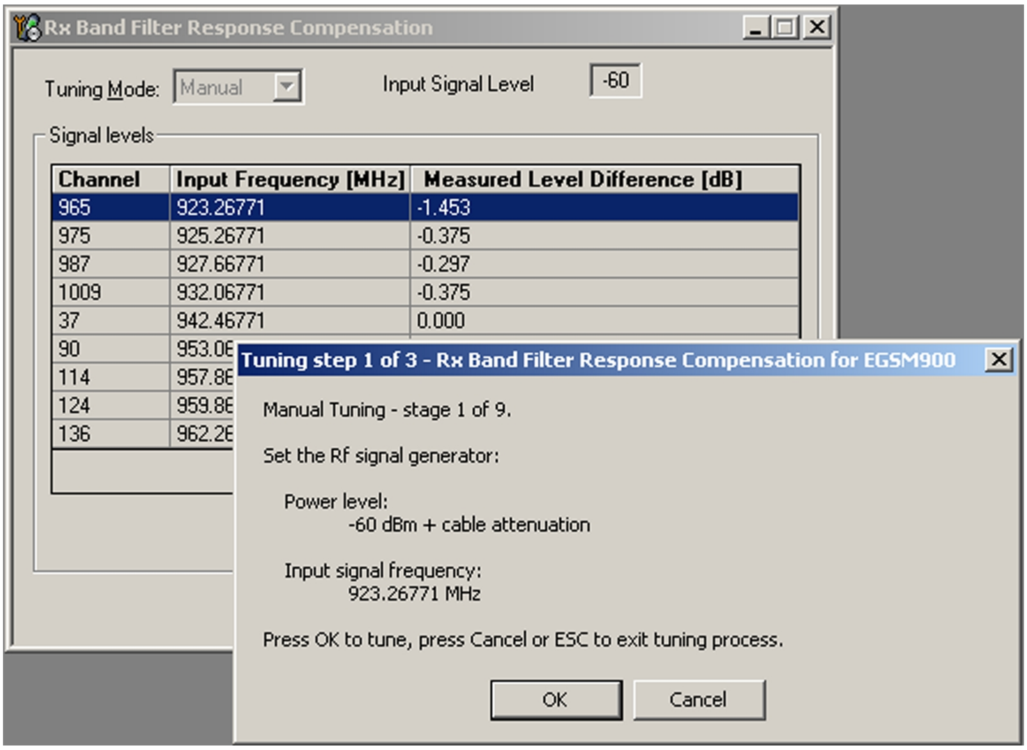

Rx Band Filter Response Compensation
Signal levels
Next
Start
Abort
Close
Help

Tuning Mode: Manual

Input Signal Level -60

Channel	Input Frequency [MHz]	Measured Level Difference [dB]

9. Connect the signal generator to the phone and set frequency and amplitude as instructed in the *Tuning step 1 of 3 - Rx Band Filter Response Compensation for EGSM900* pop-up window.


Rx Band Filter Response Compensation
Signal levels
Tuning step 1 of 3 - Rx Band Filter Response Compensation for EGSM900
OK
Cancel

Tuning Mode: Manual

Input Signal Level -60

Channel	Input Frequency [MHz]	Measured Level Difference [dB]
965	923.26771	-1.453
975	925.26771	-0.375
987	927.66771	-0.297
1009	932.06771	-0.375
37	942.46771	0.000
90	953.06	
114	957.86	
124	959.86	
136	962.26	

Manual Tuning - stage 1 of 9.

Set the Rf signal generator:

Power level:
-60 dBm + cable attenuation

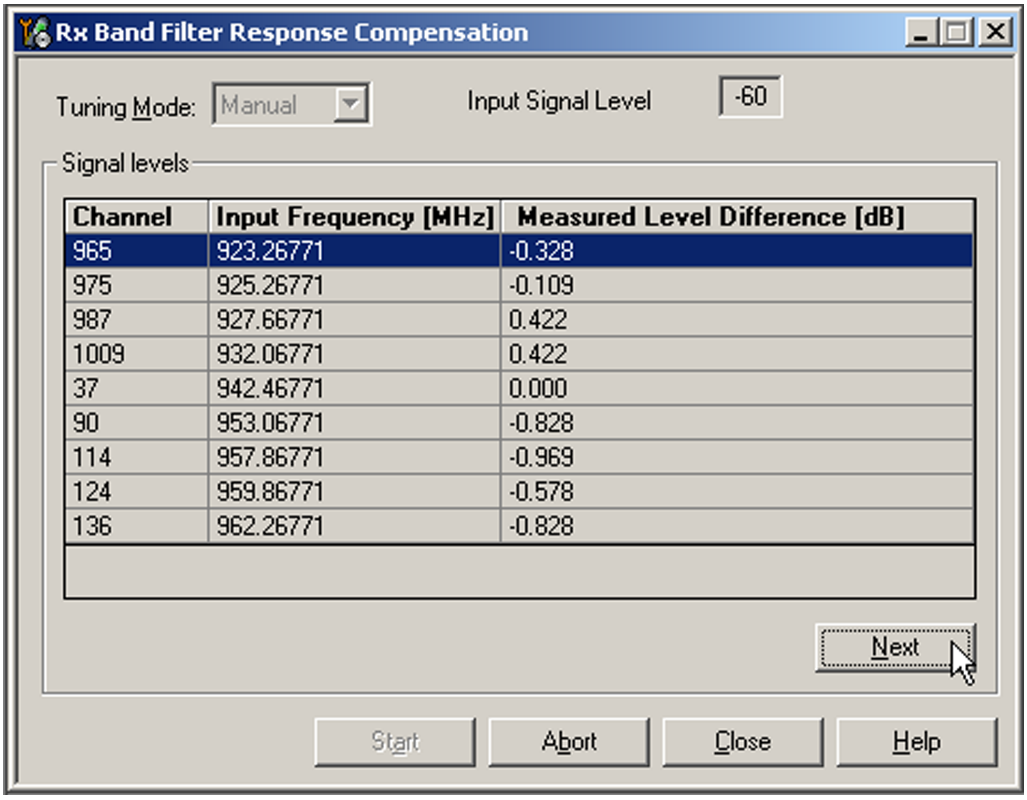
Input signal frequency:
923.26771 MHz

Press OK to tune, press Cancel or ESC to exit tuning process.

10. To perform the tuning, click **OK**.

11. Go through all 9 frequencies.

    The following window appears, showing signal levels for the input frequencies:



Tuning Mode: Manual

Input Signal Level -60

Channel	Input Frequency [MHz]	Measured Level Difference [dB]
965	923.26771	-0.328
975	925.26771	-0.109
987	927.66771	0.422
1009	932.06771	0.422
37	942.46771	0.000
90	953.06771	-0.828
114	957.86771	-0.969
124	959.86771	-0.578
136	962.26771	-0.828

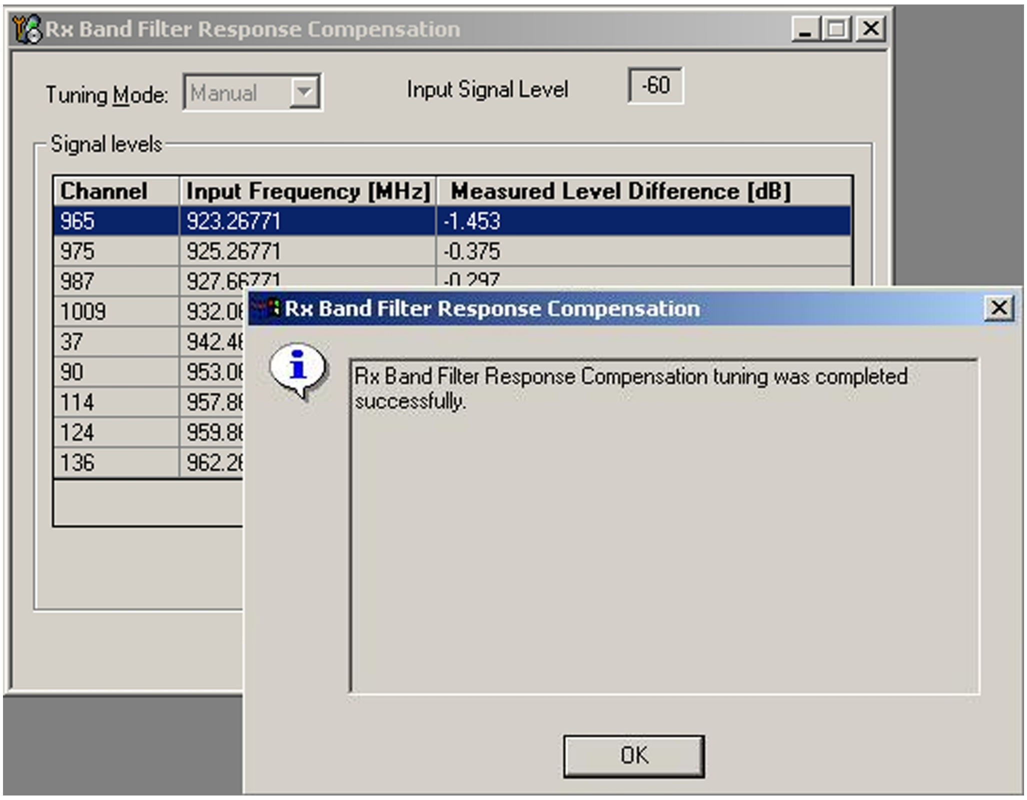
12. Check that the tuning values are within the limits specified in the following table:

	Min	Typ	Max	Unit
GSM900				
Ch. 965 / 923.26771 MHz	-10	-1	5	dB
Ch. 975 / 925.26771 MHz	-3	0	5	dB
Ch. 987 / 927.66771 MHz	-3	0	5	dB
Ch. 1009 / 932.06771 MHz	-3	0	5	dB
Ch. 37 / 942.46771 MHz	-3	0	5	dB
Ch. 90 / 953.06771 MHz	-3	0	5	dB
Ch. 114 / 957.86771 MHz	-3	0	5	dB
Ch. 124 / 959.86771 MHz	-3	0	5	dB
Ch. 136 / 962.26771 MHz	-10	-1	5	dB
GSM1800				
Ch. 497 / 1802.26771 MHz	-10	-1	5	dB
Ch. 512 / 1805.26771 MHz	-3	0	5	dB
Ch. 535 / 1809.86771 MHz	-3	0	5	dB
Ch. 606 / 1824.06771 MHz	-3	0	5	dB

	Min	Typ	Max	Unit
Ch. 700 / 1842.86771 MHz	-3	0	5	dB
Ch. 791 / 1861.06771 MHz	-3	0	5	dB
Ch. 870 / 1876.86771 MHz	-3	0	5	dB
Ch. 885 / 1879.86771 MHz	-3	0	5	dB
Ch. 908 / 1884.46771 MHz	-10	-1	5	dB
GSM1900				
Ch. 496 / 1927.06771 MHz	-10	-1	5	dB
Ch. 512 / 1930.26771 MHz	-3	0	5	dB
Ch. 537 / 1935.26771 MHz	-3	0	5	dB
Ch. 586 / 1945.06771 MHz	-3	0	5	dB
Ch. 661 / 1960.06771 MHz	-3	0	5	dB
Ch. 736 / 1975.06771 MHz	-3	0	5	dB
Ch. 794 / 1986.66771 MHz	-3	0	5	dB
Ch. 810 / 1989.86771 MHz	-3	0	5	dB
Ch. 835 / 1994.86771 MHz	-10	-1	5	dB

13. If the values are within the limits, click **Next** to continue with the next band.
14. Go through all bands, and click **Close** to end the tuning.

Results


Rx Band Filter Response Compensation
Rx Band Filter Response Compensation
OK

Tuning Mode: Manual

Input Signal Level -60

Signal levels

Channel	Input Frequency [MHz]	Measured Level Difference [dB]
965	923.26771	-1.453
975	925.26771	-0.375
987	927.66771	-0.297
1009	932.0	
37	942.4	
90	953.0	
114	957.8	
124	959.8	
136	962.2	

Rx Band Filter Response Compensation tuning was completed successfully.

Rx AM suppression (GSM)

Context

Rx AM suppression is used to tune the AM suppression capabilities of the GSM receiver.

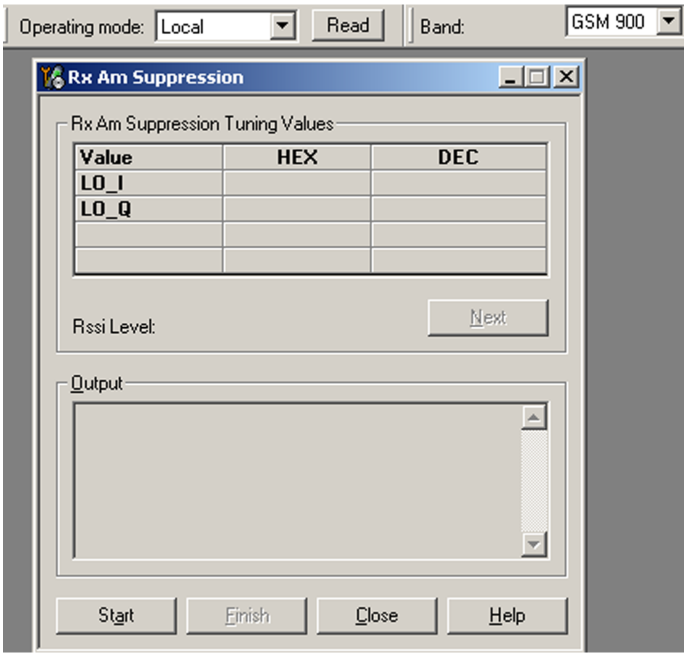
AM suppression is related to the ability of the receiver to operate when there is a disturbing AM modulated signal near the received channel signal frequency.

RFIC has a tunable compensation circuit which has an effect on the AM suppression ability.

In Rx AM suppression, a continuous signal accompanied with an AM modulated signal 10 MHz above the current channel is feed to the antenna. RFIC control word values are iterated until a minimum RSSI signal is found.

Steps

1. Connect the GSM connector of the module jig to a signal generator.
2. Start *Phoenix* service software.
3. Choose **File→Scan Product.**
4. From the drop-down menus, set **Operating mode** to **Local**, and select the **GSM900** band.
5. Choose **Tuning→GSM→Rx AM Suppression.**
6. Click **Start**.



Operating mode: Local

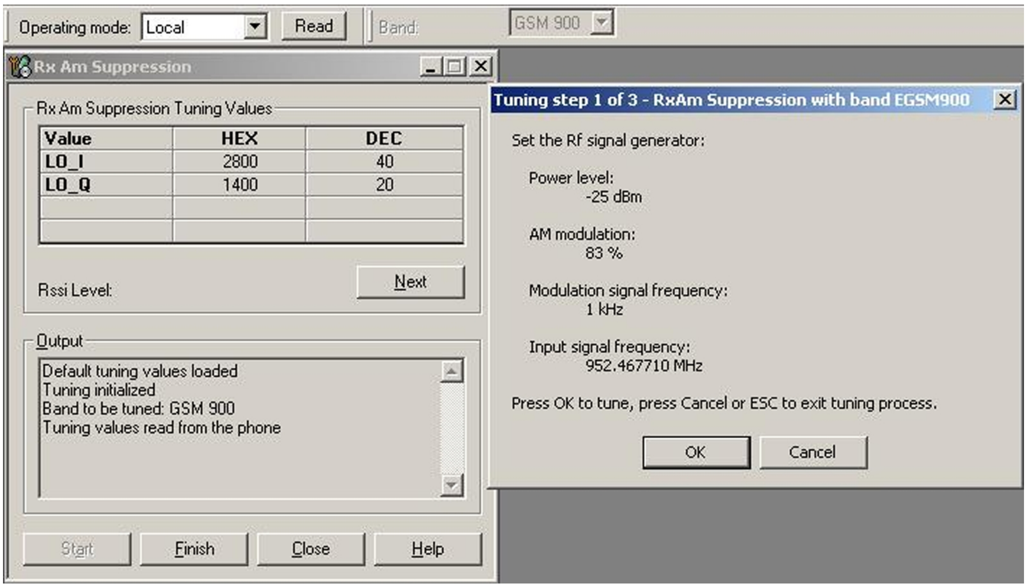
Band: GSM 900

Rx Am Suppression Tuning Values

Value	HEX	DEC
LO_I		
LO_Q		

Rssi Level:

7. Connect the signal generator to the phone according to the frequency and modulation parameters displayed in the pop-up window:



Operating mode: Local

GSM 900

Rx Am Suppression

Rx Am Suppression Tuning Values

Value	HEX	DEC
LO_I	2800	40
LO_Q	1400	20

Rssi Level:

Output

```
Default tuning values loaded
Tuning initialized
Band to be tuned: GSM 900
Tuning values read from the phone
```

Tuning step 1 of 3 - RxAm Suppression with band EGSM900

Set the Rf signal generator:

Power level:
-25 dBm

AM modulation:
83 %

Modulation signal frequency:
1 kHz

Input signal frequency:
952.467710 MHz

Press OK to tune, press Cancel or ESC to exit tuning process.

8. Click **OK**.

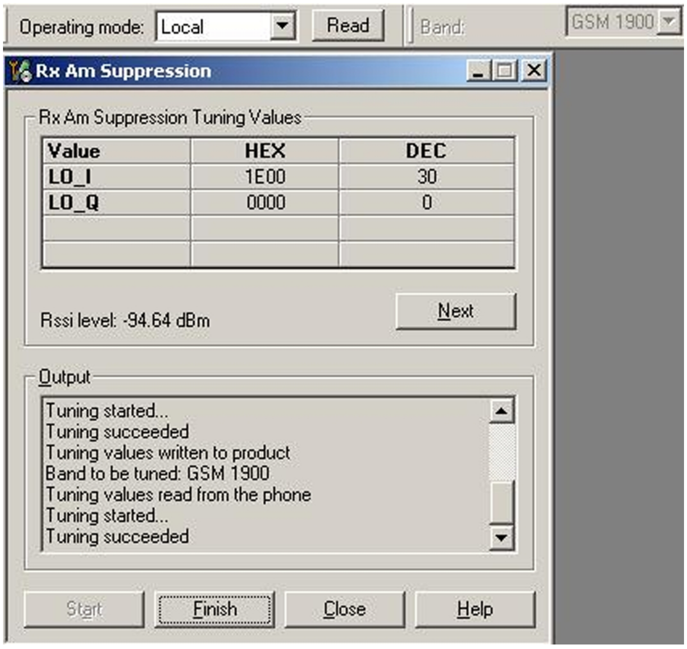
9. Check that RSSI level value is between the limits presented in the following table.

Table 19 RSSI level values

Band	Min	Max	Unit
GSM900	-115	-90	dB
GSM1800	-115	-85	dB
GSM1900	-115	-100	dB

10. To proceed to the next band, click **Next**.
11. Go through all bands.

12. To end the tuning, click **Finish** and **Close**.



Operating mode: Local

Band: GSM 1900

Rx Am Suppression Tuning Values

Value	HEX	DEC
LO_I	1E00	30
LO_Q	0000	0

Rssi level: -94.64 dBm

Output

```
Tuning started...
Tuning succeeded
Tuning values written to product
Band to be tuned: GSM 1900
Tuning values read from the phone
Tuning started...
Tuning succeeded
```

GSM transmitter tunings

Tx IQ tuning (GSM)

Context

- The Tx path branches to I and Q signals at the RF I/Q modulator. Modulator and analog hardware located after the modulator cause unequal amplitude and phase disturbance to I and Q signal paths. Tx IQ tuning balances the I and Q branches.
- Tx IQ tuning must be performed on all GSM bands.

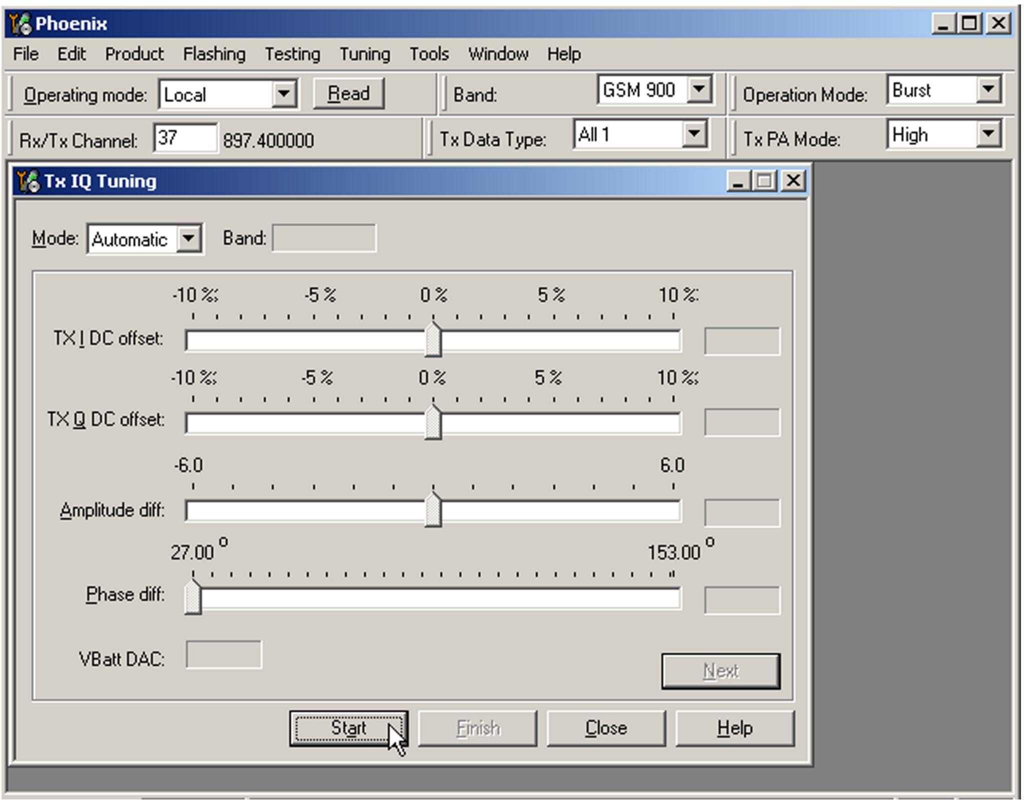
Steps

1. Start *Phoenix* service software.
2. Choose **File→Scan Product.**
3. From the **Operating mode** drop-down menu, set mode to **Local.**
4. Choose **Tuning→GSM→Tx IQ Tuning.**
5. From the **Band** drop-down menu, choose **GSM900**.
6. In the *Tx IQ Tuning* window, set mode to **Automatic**.
7. Click **Start**.

   Wait until the automatic tuning feature has finished and moved the sliders.

   Values are written to the phone memory automatically.

   Tuning sliders should be close to the center of the scale after the tuning and within the limits specified in the following table.



Operating mode: Local
Band: GSM 900
Operation Mode: Burst
Rx/Tx Channel: 37 897.400000
Tx Data Type: All 1
Tx PA Mode: High

Tx IQ Tuning

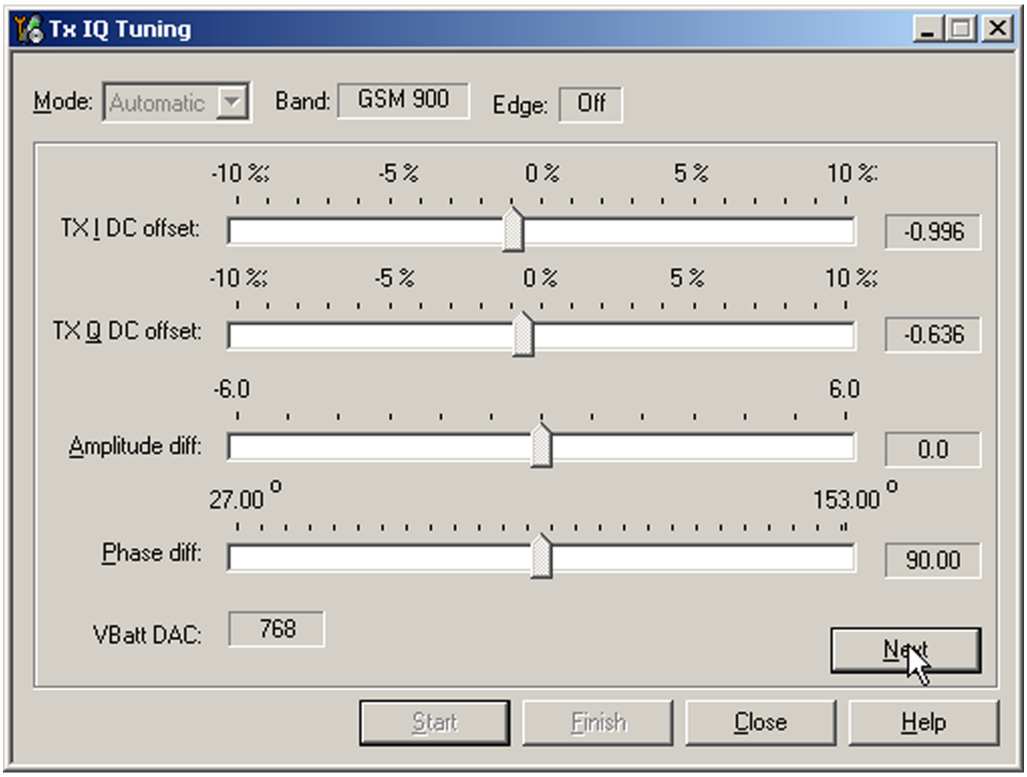
Mode: Automatic
Band:

Phoenix
File Edit Product Flashing Testing Tuning Tools Window Help
Read
-10 % -5 % 0 % 5 % 10 %
TX I DC offset:
-10 % -5 % 0 % 5 % 10 %
TX Q DC offset:
-6.0 6.0
Amplitude diff:
27.00 ° 153.00 °
Phase diff:
VBatt DAC:
Next
Start
Finish
Close
Help

Table 20 Tx IQ tuning limits

	Min	Typ	Max	Unit
GSM900				
I DC offset / Q DC offset	-6	-4/4	6	dB
Ampl	-1	0	1	dB
Phase	85	90	95	dB
GSM1800/GSM1900				
I/Q DC	-6	-0.5/0.5	6	dB
Ampl	-1	0	1	dB
Phase	95	100	110	dB

8. When the first values have been written to the phone memory, click **Next** to continue to the next band.


Tx IQ Tuning
Mode: Automatic
Band: GSM 900
Edge: Off
-10 %
-5 %
0 %
5 %
10 %
TX I DC offset:
-0.996
TX Q DC offset:
-0.636
-6.0
6.0
Amplitude diff:
0.0
27.00 °
153.00 °
Phase diff:
90.00
VBatt DAC:
768
Next
Start
Finish
Close
Help

9. Go through all bands.
10. When all bands have been tuned, click **Finish**, and **Close** to end the tuning procedure.

Next actions

If the tuning values are not within the limits specified in the "Tx IQ tuning limits" table, start the procedure again, and check the Tx IQ quality manually.

Tx power level tuning (GSM)

Context

Because of variations in the integrated circuit process and discrete component values, the actual transmitter RF gain of each phone is different. Tx power level tuning is used to find out mapping factors called 'power coefficients'. These adjust the GSM transmitter output power to fulfill the specifications.

In dual or triple band phones, the power level tuning is made for both high and low PA Modes (Power Amplifier Mode) in the GSM900 band but only for high PA mode in GSM1800/GSM1900 bands

For EDGE transmission, the bias settings of the GSM PA are adjusted in order to improve linearity. This affects the PA gain and therefore the power levels have to be aligned separately for EDGE transmission.

Tx power level tuning has to be performed on all GSM bands.

Steps

1. Connect the phone to a spectrum analyzer.
2. Start *Phoenix* service software.
3. From the **Operating mode** drop-down menu, set mode to **Local**.
4. Choose **Tuning→GSM→Tx Power Level Tuning.**

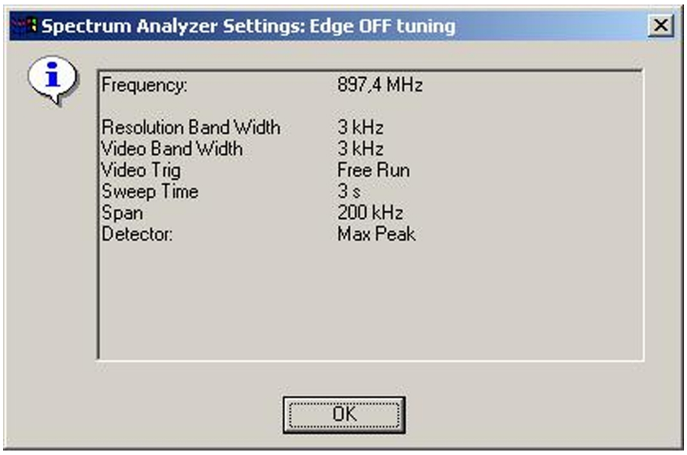
5. Click **Start**.

   The current coefficients saved in the permanent memory (PM) of the terminal are shown.

6. Set the spectrum analyzer for power level tuning:

Frequency	channel frequency (897.4MHz GSM900, 1747.8MHz GSM1800, 1880MHz GSM1900)
Span	200 kHz
Sweep time	3s
Trigger	Video triggering: Free run
Resolution BW	3 kHz
Video BW	3 kHz
Reference level offset	sum cable attenuation with module jig attenuation
Reference level	33dBm

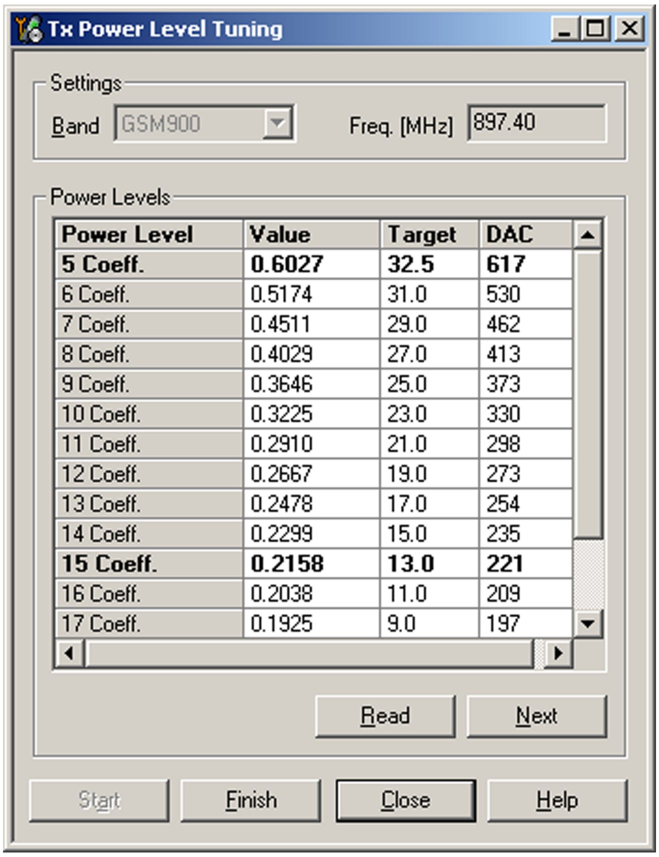
A power meter with a peak power detector can be also used. Remember to take the attenuations into account!


Spectrum Analyzer Settings: Edge OFF tuning

Frequency: 897,4 MHz

Resolution Band Width 3 kHz
Video Band Width 3 kHz
Video Trig Free Run
Sweep Time 3 s
Span 200 kHz
Detector: Max Peak

7. Adjust power levels **5**, **15** and **19** to correspond the *Target dBm* column by pressing + or – keys.



Band: GSM900
Freq. [MHz]: 897.40

Power Level	Value	Target	DAC
5 Coeff.	**0.6027**	**32.5**	**617**
6 Coeff.	0.5174	31.0	530
7 Coeff.	0.4511	29.0	462
8 Coeff.	0.4029	27.0	413
9 Coeff.	0.3646	25.0	373
10 Coeff.	0.3225	23.0	330
11 Coeff.	0.2910	21.0	298
12 Coeff.	0.2667	19.0	273
13 Coeff.	0.2478	17.0	254
14 Coeff.	0.2299	15.0	235
15 Coeff.	**0.2158**	**13.0**	**221**
16 Coeff.	0.2038	11.0	209
17 Coeff.	0.1925	9.0	197

Check that the coefficient values are within the limits specified in the following table.

	Min	Typ	Max
GSM900 EDGE off			
PL5 coefficient	0.45	0.626	0.73
PL15 coefficient		0.234	
PL19 coefficient	0.12	0.195	0.3
GSM900 EDGE on			
PL8 coefficient	0.35	0.419	0.6
PL15 coefficient		0.247	
PL19 coefficient	0.12	0.204	0.3
GSM1800 EDGE off			
PL0 coefficient	0.45	0.51	0.7
PL11 coefficient		0.219	
PL15 coefficient	0.12	0.185	0.3
GSM1800 EDGE on			
PL2 coefficient	0.35	0.394	0.6
PL11 coefficient		0.23	

	Min	Typ	Max
PL15 coefficient	0.12	0.194	0.3
GSM1900 EDGE off			
PL0 coefficient	0.45	0.482	0.7
PL11 coefficient		0.218	
PL15 coefficient	0.12	0.184	0.3
GSM1900 EDGE on			
PL2 coefficient	0.35	0.377	0.6
PL11 coefficient		0.23	
PL15 coefficient	0.12	0.193	0.3

8. If the values are within the limits, click **Next** to proceed to the next band, and click **Start**.
9. Set **Edge** mode on and start tuning again. Change video averaging to 50.
10. Tune EDGE power levels to the corresponding target power levels.

    Only power levels **8**, **15** and **19** are tuned in GSM900, and **2**, **10** and **15** in GSM1800/1900.
11. When the tuning is completed, close the *Tx Power Level Tuning* window.

WCDMA receiver tunings

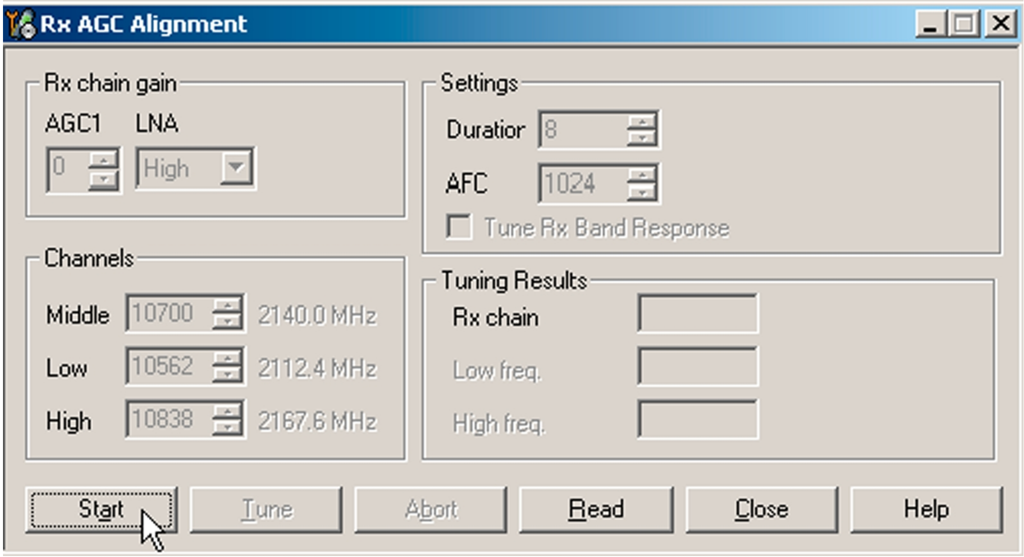
Rx AGC alignment (WCDMA)

Context

Rx AGC alignment tuning is used to find out the real gain values of the WCDMA Rx AGC system and converters.

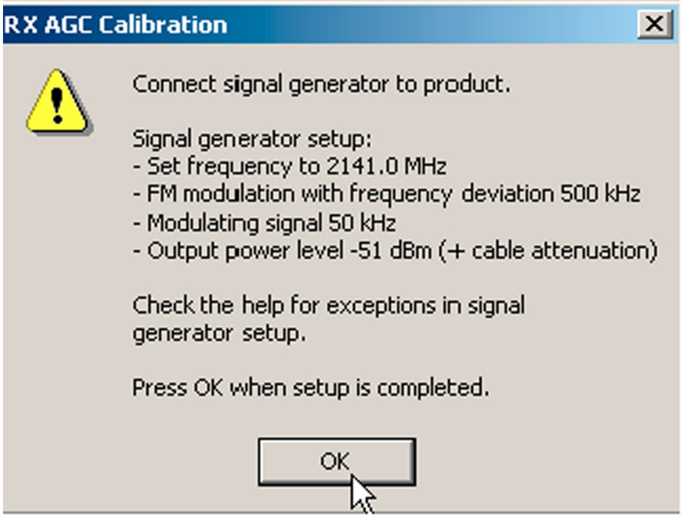
Steps

1. Connect the GSM connector of the module jig to a signal generator.
2. From the **Operating mode** drop-down menu, set mode to **Local**.
3. Choose **Tuning→WCDMA→Rx AGC Alignment** .
4. Click **Start** and **Tune**.



AGC1: 0
LNA: High
Duration: 8
AFC: 1024
☐ Tune Rx Band Response
Middle: 10700 2140.0 MHz
Low: 10562 2112.4 MHz
High: 10838 2167.6 MHz

5. Setup the signal generator to correspond the values in the *RX AGC Calibration* pop-up window and click **OK**.



Connect signal generator to product.

Signal generator setup:
- Set frequency to 2141.0 MHz
- FM modulation with frequency deviation 500 kHz
- Modulating signal 50 kHz
- Output power level -51 dBm (+ cable attenuation)

Check the help for exceptions in signal generator setup.

Press OK when setup is completed.

Frequency:	2141MHz
Level:	–51 dBm + cable and adapter attenuations
Modulation:	FM
Deviation:	500 kHz
Modulation frequency:	50 kHz

6. Check that the *Rx chain* value in *Tuning Results* is within the limits presented in the following table.

	Min	Typ	Max	Unit
RX chain	-6	1.5... 3.5	6	dB
Low freq	-5	-0.7... 4.0	5	
High freq	-5	-0.7... 4.0	5	

i If the Rx gain is acceptable, click **Yes** to save the results to the phone.

7. To close the *Rx AGC Alignment* window, click **Close**.

Rx band response calibration (WCDMA)

Context

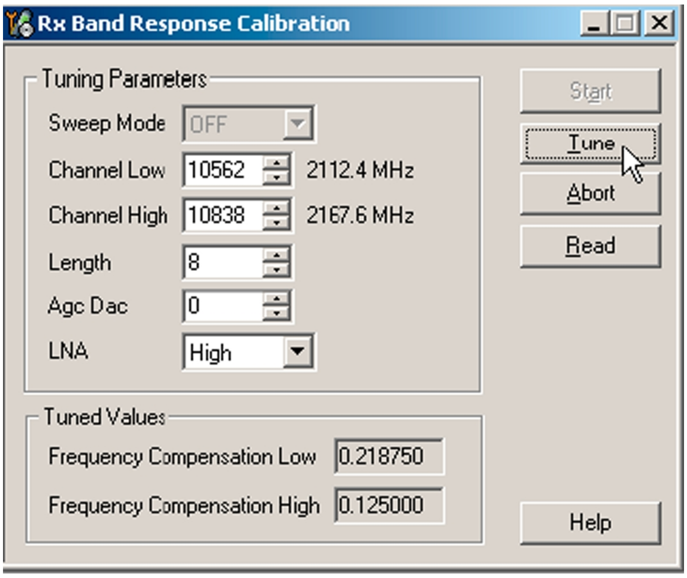
There is a band rejecting filter for each WCDMA Rx band between the front end LNA and the mixer of an RF ASIC. The amplitude ripple caused by this filter causes ripple to the RSSI measurement and therefore Rx band response calibration is needed.

The Rx band response calibration can be done in two different ways. If the signal generator used supports frequency sweep table, the calibration can be done as a part of the Rx calibration. If there is no support for the frequency sweep table , it is possible to calibrate all necessary frequencies one by one.

The first set of steps shows how to perform the calibration without the signal generator sweep feature. The alternative steps give instructions how to perform the calibration if the signal generator supports frequency sweeps, and the calibration can be performed within the Rx AGC calibration.

Steps

1. From the **Operating mode** drop-down menu, set mode to **Local**.
2. Choose **Tuning→WCDMA→Rx Band Response Calibration.**
3. Click **Start** and **Tune**.



Tuning Parameters

Sweep Mode: OFF
Channel Low: 10562 2112.4 MHz
Channel High: 10838 2167.6 MHz
Length: 8
Agc Dac: 0
LNA: High

Tuned Values

Frequency Compensation Low: 0.218750
Frequency Compensation High: 0.125000

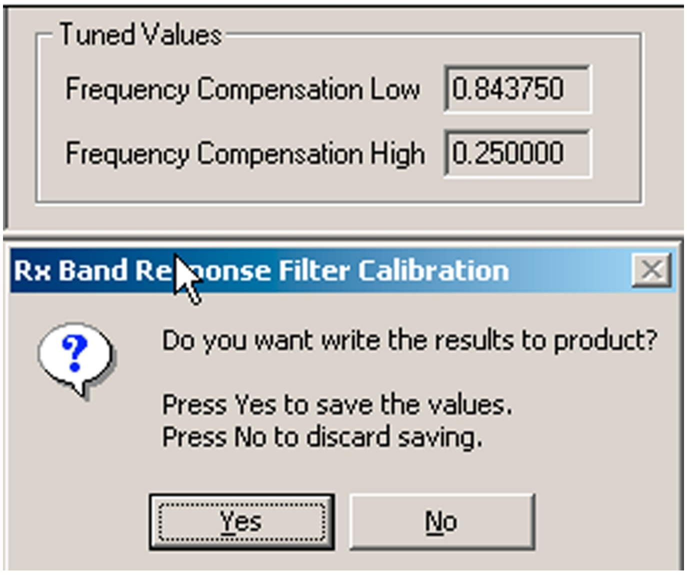
4. Setup the signal generator to correspond the values in the pop-up window:

Frequency:	2113.4 MHz
Level:	–48 dBm + cable and adapter attenuations
Modulation:	FM
Deviation:	500 kHz
Modulation frequency:	50 kHz

5. Click **OK**.
6. Change frequency to *2166.6* MHz and click **OK**.
7. Check that the tuned values are within the limits specified in the following table :

	Min	Max
Frequency compensation low	-5	+5
Frequency compensation high	-5	+5

i If the values are OK, click **Yes** to save the values.



Tuned Values

Frequency Compensation Low: 0.843750

Frequency Compensation High: 0.250000

Rx Band Response Filter Calibration

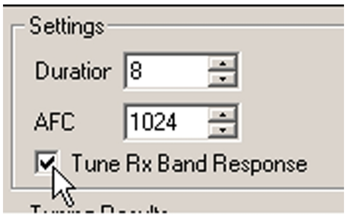
Do you want write the results to product?

Press Yes to save the values.
Press No to discard saving.

8. Close the tuning window.

Alternative steps

- From the **Operating mode** drop-down menu, set mode to **Local**.
- Choose **Tuning→WCDMA→Rx AGC Alignment.**
- Click **Start**.
- Check the **Tune Rx Band Response** check box and click **Tune**.



Settings

Duration: 8

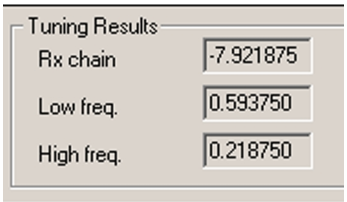
AFC: 1024

☑ Tune Rx Band Response

- Setup the signal generator according to the values in the pop-up window:

Frequency list:	2113.4 MHz, 2141 MHz and 2166.6 MHz
Dwell time:	2 ms
Sweep control:	Automatic continuous sweep
Level:	–48 dBm + cable and adapter attenuations
Modulation:	FM
Deviation:	500 kHz
Modulation frequency:	50 kHz

- Click **OK**.
- Check that the **Rx chain** , **Low freq.** and **High freq.** values in the *Tuning Results* window are within the limits presented in the following table.



Rx chain -7.921875
Low freq. 0.593750
High freq. 0.218750

	Min	Typ	Max	Unit
Rx chain	-6	1.5... 3.5	6	dB
Low freq	-5	-0.7...4.0	5	
High freq	-5	-0.7...4.0	5	

- If the Rx gain is acceptable, click **Yes** to save the results to the phone.
- To end the calibration, click **Close**.

WCDMA transmitter tunings

Tx AGC & power detector (WCDMA)

Context

Tx AGC & power detector tuning has two purposes:

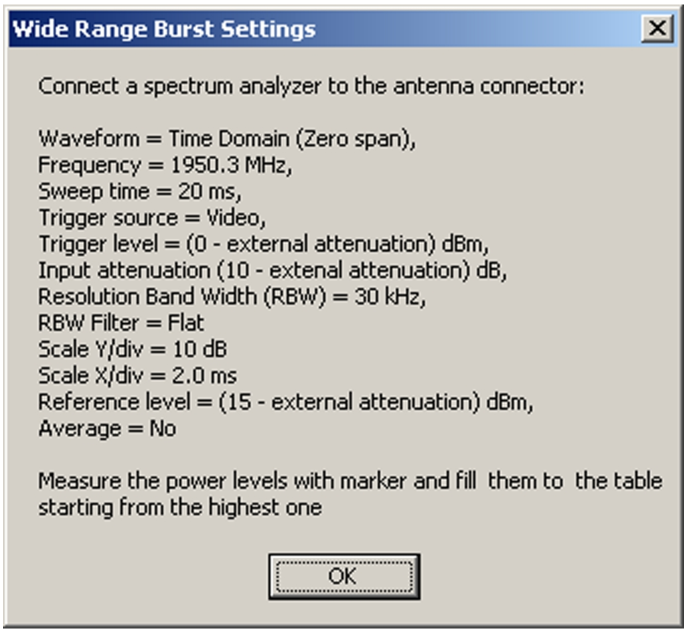
- to enable the phone to select the correct TxC value accurately in order to produce the required RF level
- to enable the phone to measure its own transmitter power accurately

There are two ways to perform the tuning. For an alternative method, see Alternative steps (page 7–55).

Steps

1. From the **Operating mode** drop-down menu, set mode to **Local**.
2. Choose **Tuning→WCDMA→Tx AGC & Power Detector.**
3. Click **Start**.
4. In the *Wide Range* pane, click **Tune** (the leftmost **Tune** button).

5. Set up the spectrum analyzer in the following way:



Connect a spectrum analyzer to the antenna connector:

Waveform = Time Domain (Zero span),
Frequency = 1950.3 MHz,
Sweep time = 20 ms,
Trigger source = Video,
Trigger level = (0 - external attenuation) dBm,
Input attenuation (10 - extenal attenuation) dB,
Resolution Band Width (RBW) = 30 kHz,
RBW Filter = Flat
Scale Y/div = 10 dB
Scale X/div = 2.0 ms
Reference level = (15 - external attenuation) dBm,
Average = No

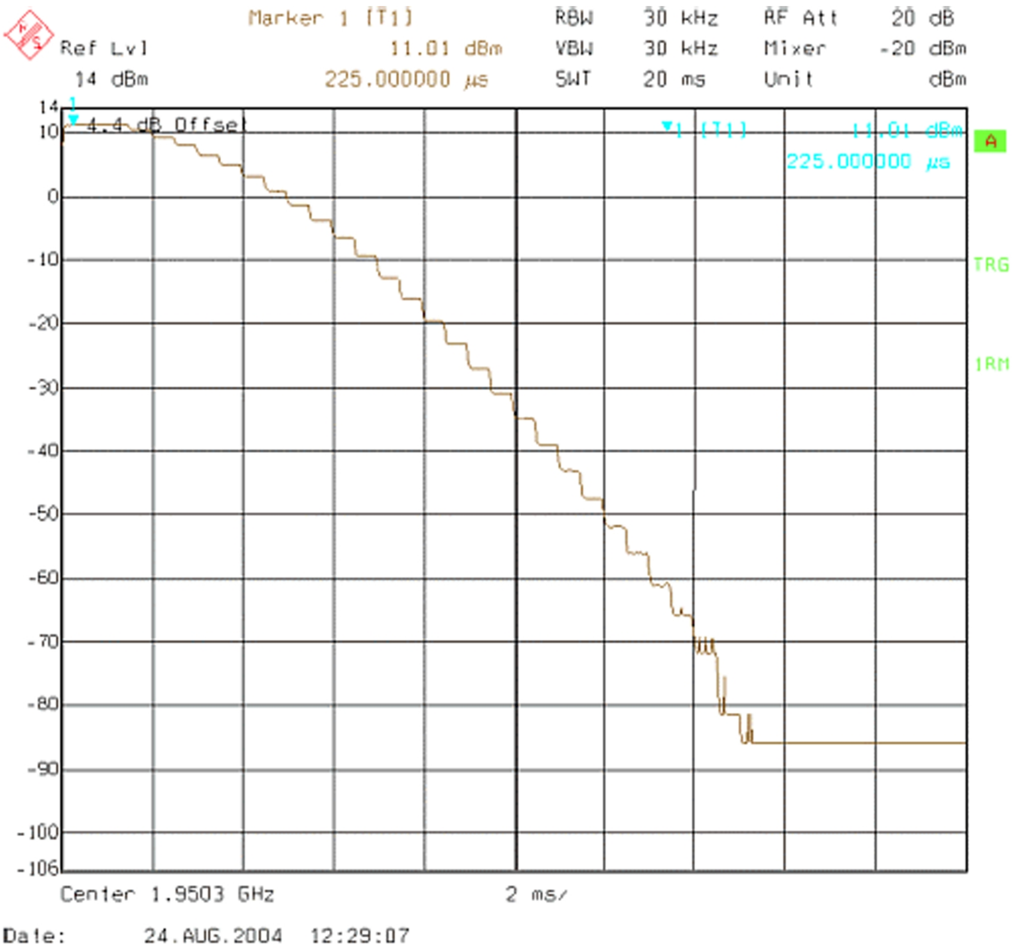
Measure the power levels with marker and fill them to the table starting from the highest one

6. After setting the spectrum analyzer, click **OK**.
7. Measure the power levels with a marker.

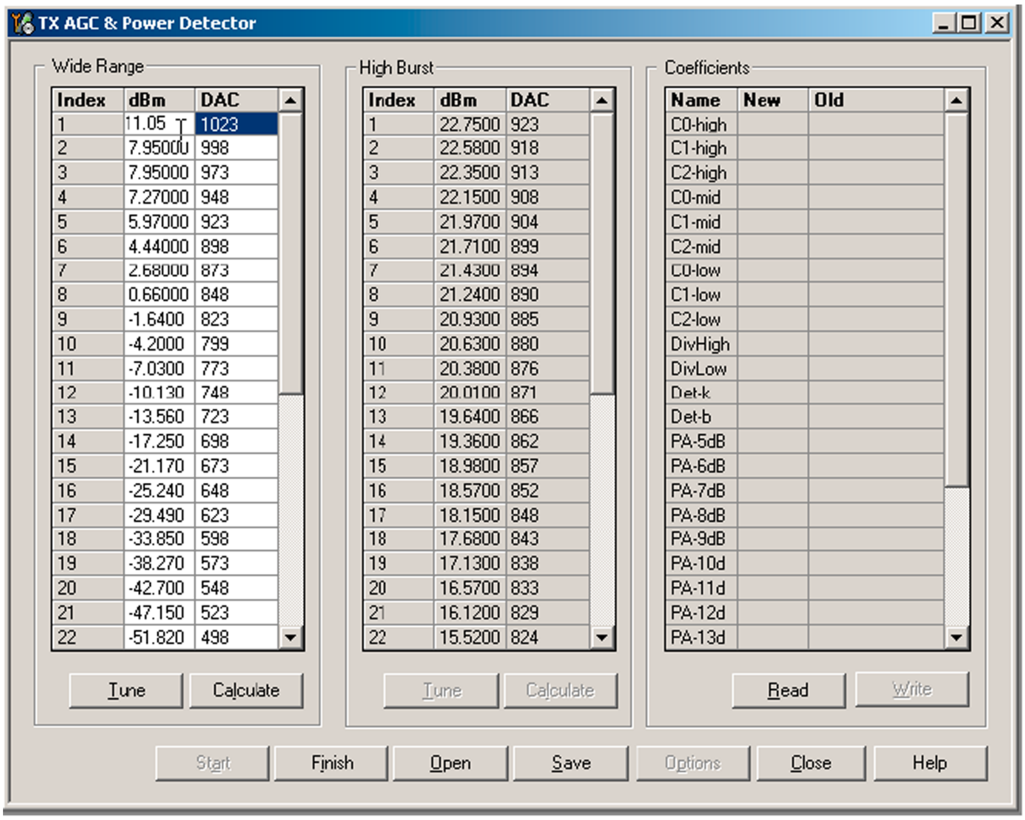
   Take the first measurement from 250 us after the trigger, the second from 750 us, the third on 1220 us and so on in every 500 us until the table is filled.

   Note: It must be possible to measure power levels down to –68 dBm. The measured power levels must be monotonously decreasing.

   Make sure that the marker is not measuring the level of noise spike on lower levels.


Marker 1 [T1]
Ref Lvl
14 dBm
11.01 dBm
225.000000 µs
RBW 30 kHz
VBW 30 kHz
SWT 20 ms
RF Att 20 dB
Mixer -20 dBm
Unit dBm
4.4 dB Offset
▼1 [T1] 11.01 dBm
225.000000 µs
A
TRG
1RM
14
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-106
Center 1.9503 GHz
2 ms/
Date: 24.AUG.2004 12:29:07

8. Fill in the power level values (in dBm) to the *Wide Range* table.



Wide Range

Index	dBm	DAC
1	11.05	1023
2	7.95000	998
3	7.95000	973
4	7.27000	948
5	5.97000	923
6	4.44000	898
7	2.68000	873
8	0.66000	848
9	-1.6400	823
10	-4.2000	799
11	-7.0300	773
12	-10.130	748
13	-13.560	723
14	-17.250	698
15	-21.170	673
16	-25.240	648
17	-29.490	623
18	-33.850	598
19	-38.270	573
20	-42.700	548
21	-47.150	523
22	-51.820	498

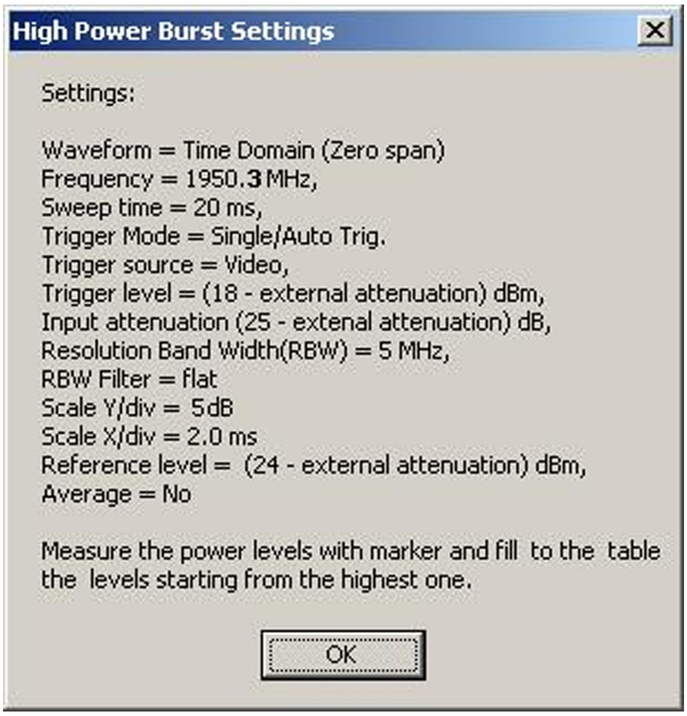
High Burst

Index	dBm	DAC
1	22.7500	923
2	22.5800	918
3	22.3500	913
4	22.1500	908
5	21.9700	904
6	21.7100	899
7	21.4300	894
8	21.2400	890
9	20.9300	885
10	20.6300	880
11	20.3800	876
12	20.0100	871
13	19.6400	866
14	19.3600	862
15	18.9800	857
16	18.5700	852
17	18.1500	848
18	17.6800	843
19	17.1300	838
20	16.5700	833
21	16.1200	829
22	15.5200	824

Coefficients

Name	New	Old
C0-high		
C1-high		
C2-high		
C0-mid		
C1-mid		
C2-mid		
C0-low		
C1-low		
C2-low		
DivHigh		
DivLow		
Det-k		
Det-b		
PA-5dB		
PA-6dB		
PA-7dB		
PA-8dB		
PA-9dB		
PA-10d		
PA-11d		
PA-12d		
PA-13d		

9. In the *Wide Range* pane, click **Calculate**.
10. In the *High Burst* pane, click **Tune**.
11. Adjust the spectrum analyzer according to the following settings:



Settings:

Waveform = Time Domain (Zero span)
Frequency = 1950.3 MHz,
Sweep time = 20 ms,
Trigger Mode = Single/Auto Trig.
Trigger source = Video,
Trigger level = (18 - external attenuation) dBm,
Input attenuation (25 - extenal attenuation) dB,
Resolution Band Width(RBW) = 5 MHz,
RBW Filter = flat
Scale Y/div = 5dB
Scale X/div = 2.0 ms
Reference level = (24 - external attenuation) dBm,
Average = No

Measure the power levels with marker and fill to the table the levels starting from the highest one.

12. Measure the power levels with a marker.

    Take the first measurement from 250 us after the trigger, the second from 750 us, third on 1220 us and so on in every 500 us until the table is filled.

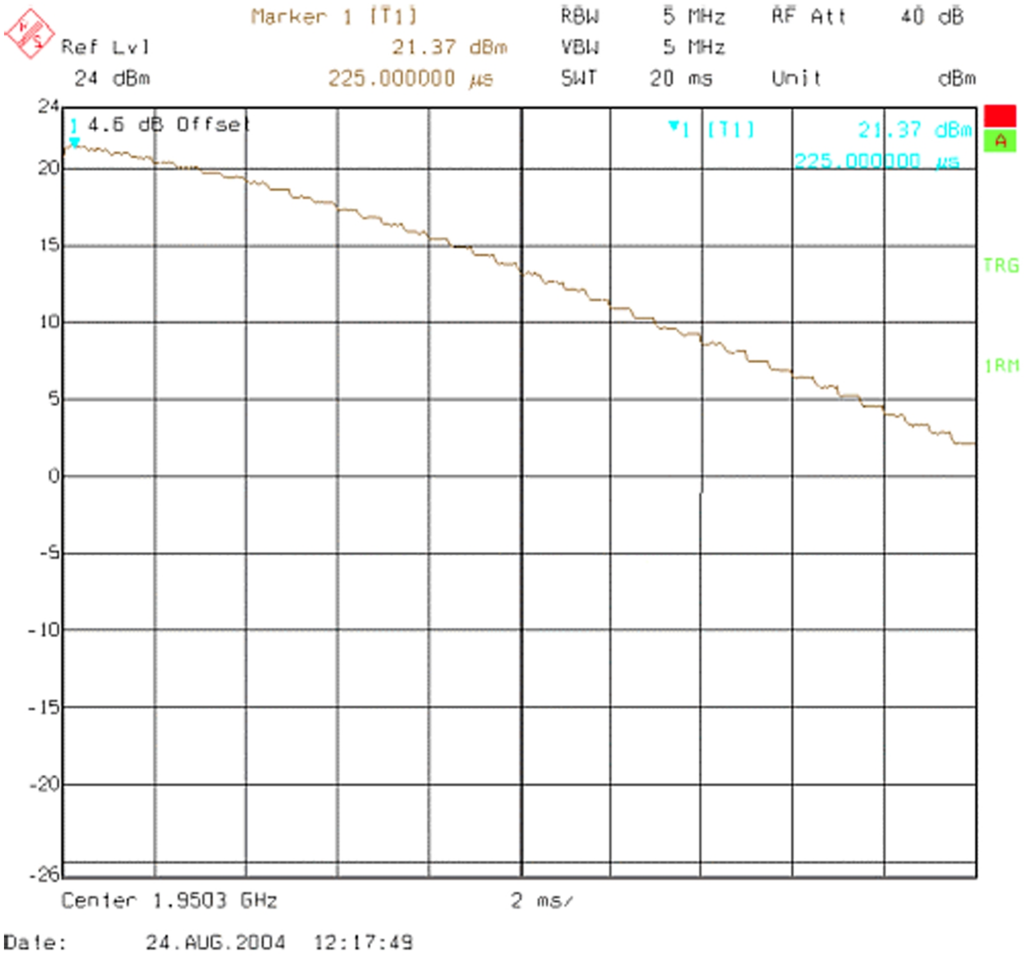

Marker 1 [T1]
Ref Lvl
24 dBm
21.37 dBm
225.000000 µs
RBW 5 MHz
VBW 5 MHz
SWT 20 ms
RF Att 40 dB
Unit dBm
1 4.6 dB Offset
▼1 [T1] 21.37 dBm
225.000000 µs
A
TRG
1RM
24
20
15
10
5
0
-5
-10
-15
-20
-26
Center 1.9503 GHz
2 ms/
Date: 24.AUG.2004 12:17:49

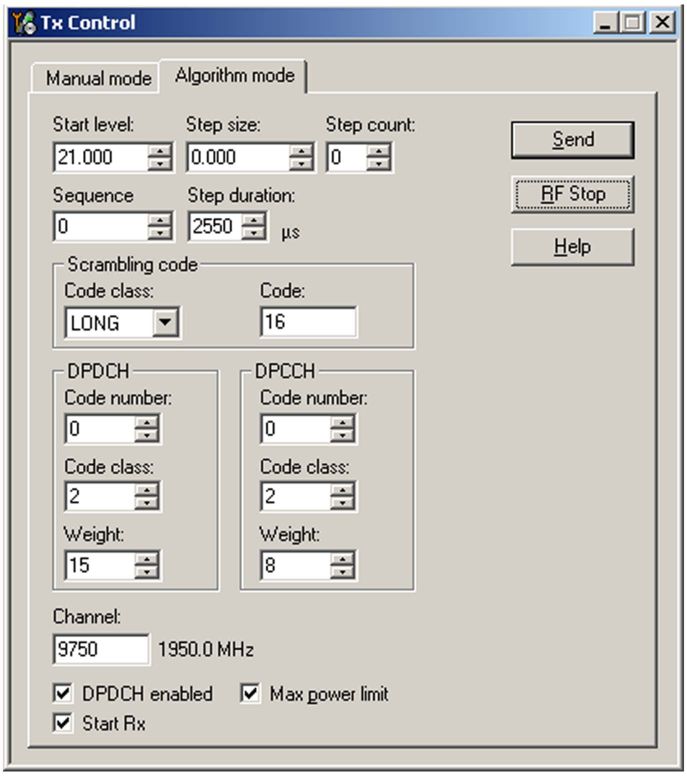
Figure 59 High burst measurement

13. In the *High Burst* pane, click **Calculate**.
14. Check that the calculated values are within the limits specified in the following table:

	Min	Max
C0-high	-0.5	5
C1-high	-50	50
C2-high	400	900
C0-mid	-0.7	0.7
C1-mid	0	50
C2-mid	400	900
C0-low	-4	4
C1-low	-400	440
C2-low	-10000	15000

	Min	Max
Det-k	100	220
Det-b	0	150

15. To save the coefficients to the phone, click **Write**.
16. To close the *Tx AGC & Power Detector* window, click **Close**.
17. Choose **Testing→WCDMA→ Tx Control.**
18. Select the *Algorithm* mode tab.



Start level: 21.000
Step size: 0.000
Step count: 0
Sequence: 0
Step duration: 2550 µs

Scrambling code
Code class: LONG
Code: 16

DPDCH
Code number: 0
Code class: 2
Weight: 15

DPCCH
Code number: 0
Code class: 2
Weight: 8

Channel: 9750 1950.0 MHz

☑ DPDCH enabled ☑ Max power limit
☑ Start Rx

19. Write the target power level 25 dBm to the *Start level* line and check the **Max power limit** check box (detector calibration check).
20. Setup the spectrum analyzer with the following settings:

Center frequency:	**1950.3 MHz**
Span:	0 Hz
Reference level offset:	Cable attenuations + adapter attenuation
Reference level:	**24 dBm or -20 dBm depending on the level measured**
Input attenuation:	Automatic
Resolution bandwidth:	5 MHz
Video bandwidth:	5 MHz
Sweep time:	20 ms
Detector:	**RMS detector**

Average:	No
Trigger:	Free run

21. Click **Send**.
22. Measure the WCDMA output power.

    It should be around 21 dBm.
23. Click **RF Stop** and uncheck the **Max power limit** check box.
24. Repeat steps **19** to **23** for levels +19, +7, 0, -20 and –40 dBm.

    The measured output power may not differ more than +-2 dB from the requested value at level +19 dBm and no more than +-4 dB on lower levels.

    Remember to stop the RF before sending new data.

Alternative steps

- Measure the wide range levels normally and write down the levels that are possible to measure.
- Click **Finish**.
- Click **Options**.
- Change the first wide range DAC value to *573* and change the number of tuning steps to *21*.
- Change the spectrum analyzer reference level to *–20* dBm and adjust the input attenuator to the lowest value possible.
- In the *Wide Range* pane, click **Tune** and fill in the rest of values starting from the 19th level.

Tx band response calibration (WCDMA)

Context

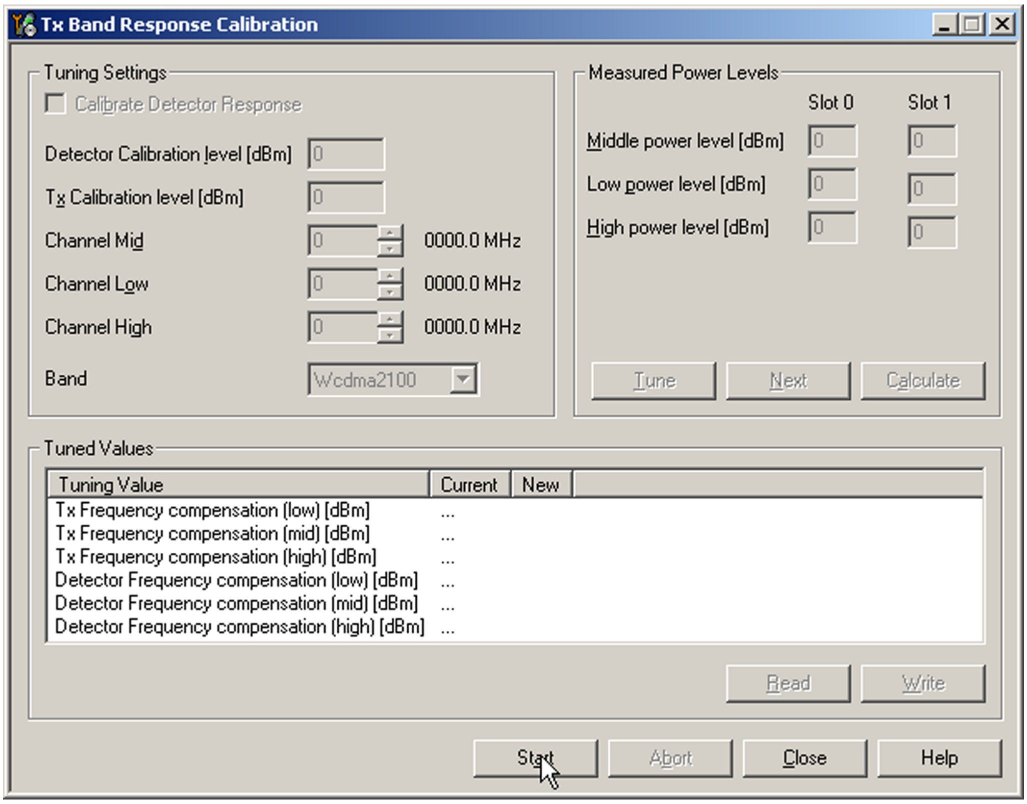
The purpose of this tuning operation is to calibrate the WCDMA Tx performance. It defines the power detector and Tx frequency compensation values. However, before starting this tuning procedure, it is necessary to carry out Tx AGC & Power Detector Calibration tuning. This is because its results will be needed for this tuning operation.

- In the *Tuning Settings* pane, it is possible to edit the numbers of channels used in this tuning operation.
- If the **Calibrate Detector Response** check box is checked, only Tx response is calibrated. Zero is written to the power detector compensation values block in the permanent memory (PM) of the terminal.
- **Detector Calibration level** shows the power level used for calibrating the power detector in this tuning procedure.
- **Tx Calibration level** shows the power level used for calibrating tx frequency in this tuning procedure.
- In *Measured Power Levels* pane, you can insert the dBm values read from the power meter.
- In *Tuned Values* pane, the values that are stored in the permanent memory (PM) of the terminal in Current columns are shown.
- New values are added to *New* column when the **Calculate** button is clicked.
- **Abort** button aborts the tuning operation without saving the tuned values.
- **Read** button reads the tuned values in the PM of the terminal, and displays them in the *Tuned Values* pane in in the *Current* column.

Steps

1. Start *Phoenix* service software.
2. Choose **File→Scan Product** .

3. From the **Operating mode** drop-down menu, set mode to **Local**.
4. Choose **Tuning→WCDMA→Tx Band Response Calibration** .
5. Click **Start**.



☐ Calibrate Detector Response

Detector Calibration level [dBm] 0

Tx Calibration level [dBm] 0

Channel Mid 0 0000.0 MHz

Channel Low 0 0000.0 MHz

Channel High 0 0000.0 MHz

Band Wcdma2100

	Slot 0	Slot 1
Middle power level [dBm]	0	0
Low power level [dBm]	0	0
High power level [dBm]	0	0

Tuning Value	Current	New
Tx Frequency compensation (low) [dBm]	...	
Tx Frequency compensation (mid) [dBm]	...	
Tx Frequency compensation (high) [dBm]	...	
Detector Frequency compensation (low) [dBm]	...	
Detector Frequency compensation (mid) [dBm]	...	
Detector Frequency compensation (high) [dBm]	...	

The current values are shown in the *Tuned Values* pane.

6. Click **Tune**.
7. Connect the power meter to the terminal, and set it to **Channel Mid** frequency.
8. Read the values of slot 0 and slot 1 from the power meter and enter them to **Middle power level** fields in the **Measured Power Levels** pane.

   Slot 0 is used for detector calibration and slot 1 for Tx calibration.
9. Click **Next**.
10. Switch the power meter to **Channel Low** frequency.
11. Read the values from the power meter, and enter them to **Low power level** fields.
12. Switch the power meter to **Channel High** frequency.
13. Read the values from the power meter, and enter them to **High power level** fields.
14. Click **Next**.
15. Click **Calculate**.

    The tuned values are shown in the *Tuned Values* pane in the *New* column.
16. Check that the tuned values are within the limits presented in the following table. If they are OK, click **Yes**.

	Min	Max
Tx Freq Comp (the first and last value)	-4	+4

17. To save the tuned values to the terminal, click **Write**.
18. Close the *Tx Band Response Calibration* window.

Tx LO leakage (WCDMA)

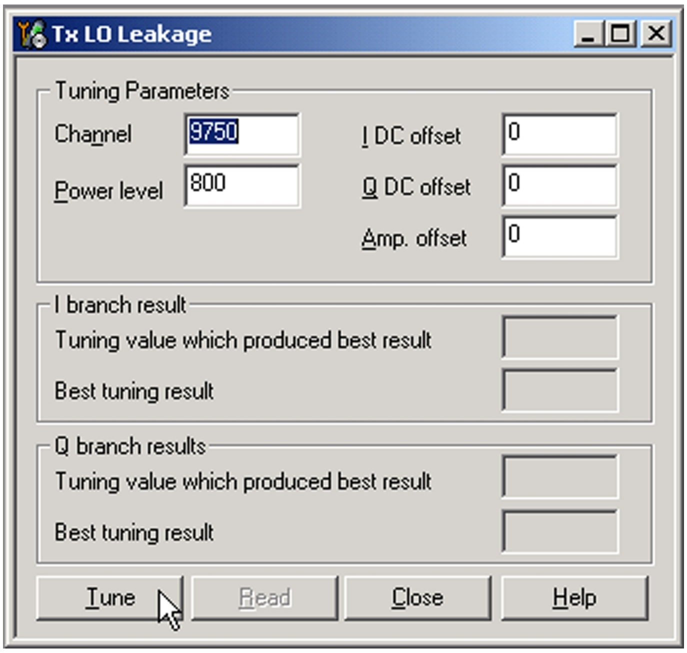
Context

The purpose of Tx LO leakage tuning is to minimize the carrier leakage of the IQ-modulator which is caused by the DC offset voltages in the Tx IQ-signal lines and in the actual IQ modulator.

The tuning improves WCDMA Tx AGC dynamics at low power levels. A self-calibration routine selects the best combination for internal control words in order to produce minimum LO leakage.

Steps

1. From the **Operating mode** drop-down menu, set mode to **Local**.
2. Choose **Tuning**→**WCDMA**→ **Tx LO Leakage** .
3. Click **Tune**.



Tx LO Leakage

Tuning Parameters

Channel: 9750

Power level: 800

I DC offset: 0

Q DC offset: 0

Amp. offset: 0

I branch result

Tuning value which produced best result

Best tuning result

Q branch results

Tuning value which produced best result

Best tuning result

4. To end the tuning, click **Close**.

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8 — Camera Module Troubleshooting

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Introduction to camera module troubleshooting

Background, tools and terminology

Faults or complaints in camera operation can be roughly categorised into three subgroups:

1. Camera is not functional at all; no image can be taken.
2. Images can be taken but there is nothing recognizable in them.
3. Images can be taken, and they are recognizable but for some reason the quality of images is seriously degraded.

It is hard to measure image quality quantitatively. Even comparative measurements are difficult (comparing two images) to perform, if the difference is small. Especially, if the user is not satisfied with his/her device's image quality, it is fairly difficult to accurately test the device, and get an exact figure that would tell whether the device is functioning properly.

Often subjective evaluation has to be used for finding out if a certain property of the camera is acceptable. Some training or experience of a correctly operating reference device may be needed in order to detect what actually is wrong.

It is easy for the user to take bad images in bad conditions. Therefore, the camera operation has to be checked always in constant conditions (lighting, temperature) or by using a second, known-to-be good device as reference.

Tools

Phoenix service software is not recommended for camera troubleshooting because at the moment it only supports relatively few features of the camera functionality. Instead, use the phone's camera application for functionality checking.

You can use camera application with the product-specific module jig.

Terms

Autofocus (AF)	The camera module contains lens movement mechanics for focus adjustment. Autofocus enables camera to take sharp images of objects positioned between 30 cm to infinity. In the AF mode, the viewfinder image is momentarily blurred as the camera searches for the right focus setting.
Digital Zoom	A digital zoom can be described as a form of cropping the image. When using a digital zoom, the camera enlarges the image area at the centre of the frame and discards the outside edges of the image.
Dynamic range	The ability of the camera to capture details in dark and bright areas of the scene simultaneously.
Distortion	A divergence from rectilinear projection caused by a change in magnification with increasing distance from the optical axis of an optical system. If the magnification increases with distance, it produces pincushion distortion; if it decreases with distance, the effect is barrel distortion.
Exposure time	Camera modules use a silicon sensor to collect light and to form an image. The imaging process roughly corresponds to traditional film photography, in which exposure time means the time during which the film is exposed to light coming through optics. Increasing the time will allow for more light hitting the film and thus results in brighter images. The operation principle is exactly the same with a silicon sensor.

F-number	The f-number or focal ratio of an optical system expresses the diameter of the entrance pupil in terms of the effective focal length of the lens. The f-number of the main camera is F3.3 at wide and F5.9 at tele.
Flare, Ghost	A phenomenon of some images produced by optical systems pointed toward bright sources of light. It is caused by the scattering, reflection, and refraction of light in lens systems. Lenses with large numbers of elements such as zooms tend to exhibit greater lens flare, as there are more surfaces off which reflection can occur.
Flicker	Phenomenon, which is caused by pulsating in scene lighting, typically appearing as wide horizontal stripes in an image.
LED flash	LED is used as strobe flash light. The device implements 4 in 1 type LED flash. The LED flash can be used in flash (brighter) mode when taking still image and in torch (darker) mode when recording video.
Mechanical shutter	The camera module contains a mechanical shutter.
Night mode	Night mode allows bigger analogue gain than normal mode. It is suitable for taking pictures in low ambient light (dark) condition.
Noise	Variation of response between pixels with same level of input illumination.
Optical zoom	The camera module contains lens movement mechanics for up to 2.75x zoom. Optical zoom can be used with digital zoom (up to 20x); the maximum combined zoom ratio is 55x.
Resolution	The amount of pixels in the camera sensor. In some occasions the term resolution is used for describing the sharpness of the images.
Sensitivity	The light sensitivity of the camera. In equivalent illumination conditions, a less sensitive camera needs a longer exposure time to gather enough light in forming a good image. Analogous to ISO speed in photographic film.
Sharpness	Good quality images are 'sharp' or 'crisp', meaning that image details are well visible in the picture. However, certain issues, such as non-idealities in optics, cause image blurring, making objects in picture to appear 'soft'. Each camera type typically has its own level of performance. Image gets softer at increased zoom ratio.
White balance mode	White balance is a technical method to adapt digital cameras and video equipment to the colour temperature of the dominant light sources in the scene. This is done by adjusting the weighting of the output channels of the image sensor (usually RGB), so that a white surface will again appear white in the resulting picture for a given lighting situation. The device supports five white balance modes (Auto, Daylight, Cloudy, Tungsten, Fluorescent). In many cases, "Auto" mode gives best white balance but users can choose dedicated white balance mode under particular lighting condition

The effect of image taking conditions on image quality

There are some factors, which may cause poor image quality, if not taken into account by the end user when shooting images, and thus may result in complaints. The items listed are normal to camera operation and are not a reason for changing the camera module.

Distance to target

The lens in the module is specified to operate satisfactorily from 30 cm to infinite distance of scene objects. In practice, the operation is such that close objects may be noticed to get more blurred when distance to them is shorter than 30 cm. The lack of sharpness is first visible in full resolution images. If observing just the viewfinder, even very close objects may seem to appear sharp. This is normal; do not change the camera module.

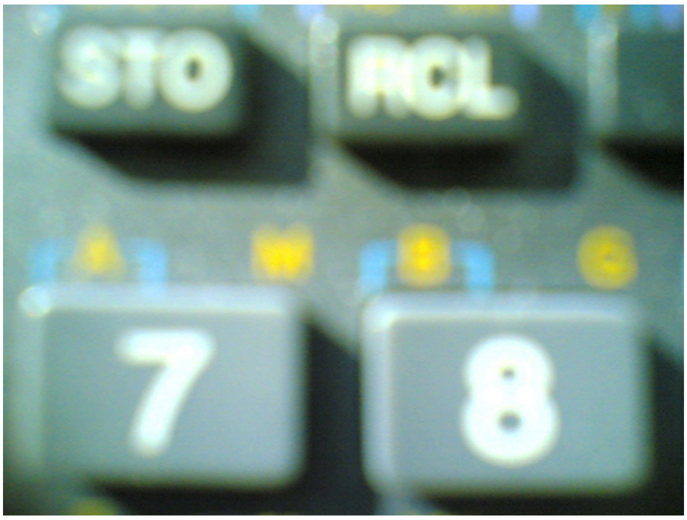


Figure 60 Blurred image. Target too close.

The amount of light available

In dim conditions camera runs out of sensitivity. The exposure time is long (especially in the night mode) and the risk of getting shaken (= blurred) images increases. In addition, image noise level grows. The maximum exposure time is 1/6 seconds. Therefore, images need to be taken with extreme care and by supporting the phone when the amount of light reflected from the target is low. Because of the longer exposure time and larger gain value, noise level increases in low light conditions. Sometimes blurring may even occur in daytime, if the image is taken very carelessly. Examples of carelessness are handshake introduced by handshake or by shutter button pressing operation. Strength against handshake or shutter button operation depends on product concepts. See the figure below for an example. This is normal; do not change the camera module.

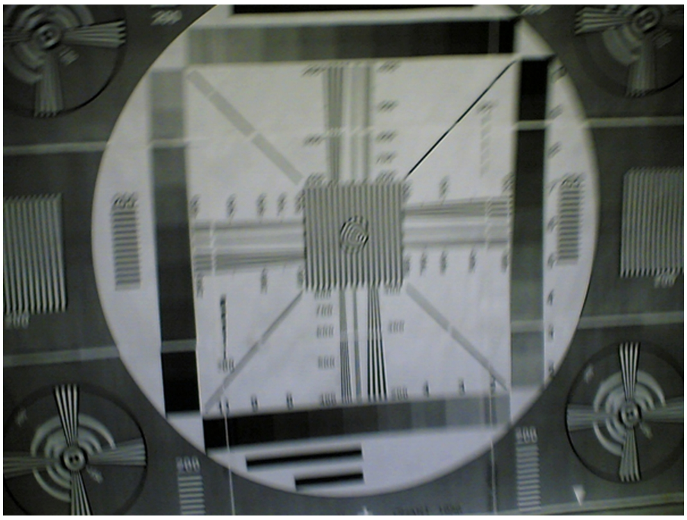


Figure 61 Blurring caused by shaking hands

Movement in bright light

If an image is taken of moving objects or if the device is used in a moving vehicle, object 'skewing' or 'tilting' may occur. This phenomenon is fundamental to most CMOS camera types, and usually cannot be avoided. The movement of camera or object sometimes cause blurring indoors or in dim lighting conditions because of long exposure time. This is normal; do not change the camera module.

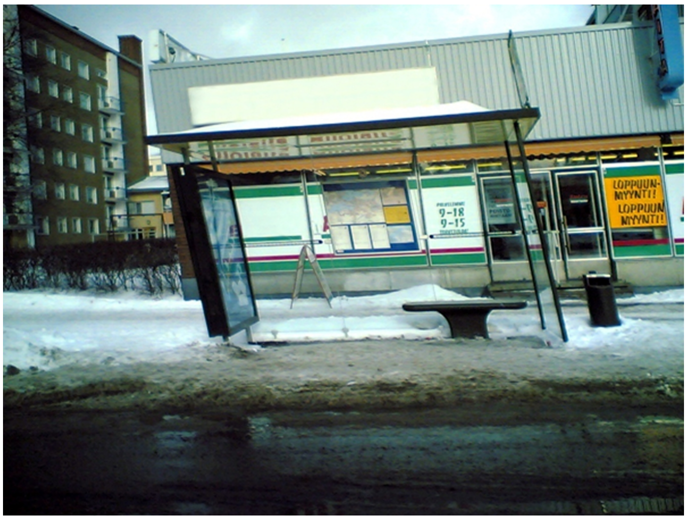


Figure 62 Near objects get skewed when taking images from a moving vehicle

Temperature

High temperatures inside the mobile phone cause more noise to appear in images. In the worst case, some colors of image completely change. For example, in +70 degrees (Celsius), the noise level may be very high, and it further grows if the conditions are dim. If the phone processor has been heavily loaded for a long time before taking an image, the phone might have considerably higher temperature inside than in the surrounding environment. This is also normal to camera operation; do not change the camera module.

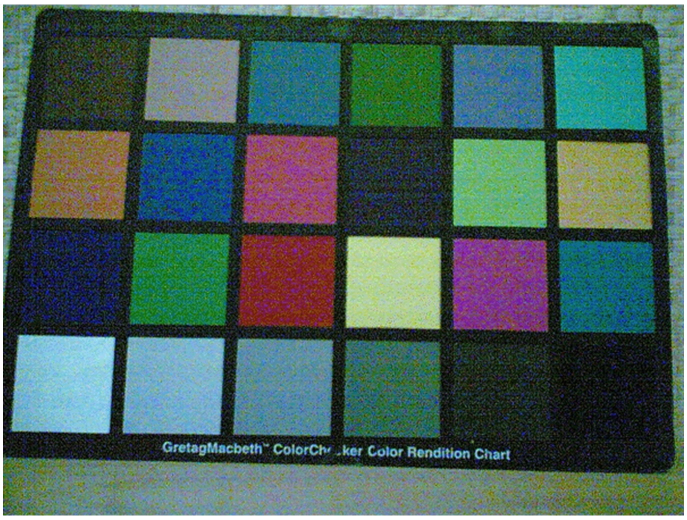


Figure 63 Noisy image taken in +70 degrees Celsius

Phone display

If the display contrast is set too dark, the image quality degrades: the images may be very dark depending on the setting. If the display contrast is set too bright, image contrast appears bad and "faint". This problem is solved by setting the display contrast correctly. This is normal behaviour; do not change the camera module.

Basic rules of photography

Because of dynamic range limitations, taking images against bright light might cause either saturated image or the actual target appear too dark. In practice, this means that when taking an image indoors and having, for example, a window behind the object, the result is usually poor. Sometimes level of exposure is a preference issue: e.g. overexposed is preferred to take pictures of human to reproduce their face brighter. This is normal behavior; do not change the camera module.

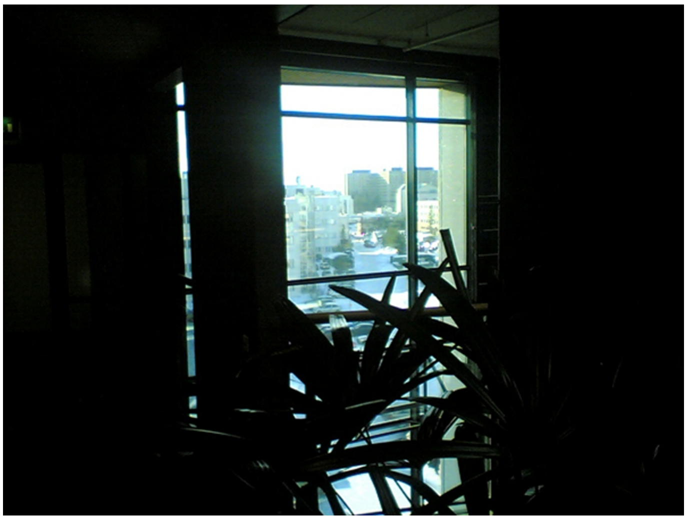


Figure 64 Image taken against light

Flicker

In some occasions a bright fluorescent light may cause flicker in the viewfinder and captured image. This phenomenon may also be a result, if images or video are taken indoors under the mismatch of 50/60 Hz electricity network frequency. The electricity frequency used is automatically detected by the camera module in video mode or specified by the end-user in still mode. In some very few countries, both 50 and 60 Hz networks are present and thus probability for the phenomenon increases. Flickering occurs also under high artificial illumination level. For example, in taking scenes containing PC monitor or high illuminating object based on electrical frequency, not only the brigtheness but also white balance would be drifted and perceived as flickers. This is normal behavior; do not change the camera module.

Figure 65 Flicker in an image; object illuminated by strong fluorescent light

Bright light outside of image view

Especially the sun can cause clearly visible lens glare phenomenon and poor contrast in images. This happens because of undesired reflections inside the camera optics. Generally this kind of reflections are common in all optical systems. In some occasions, incoming light through optics to image sensor are reflected at the microlens on the image sensor, which causes colored reflections like grape. This is normal behavior; do not change the camera module.

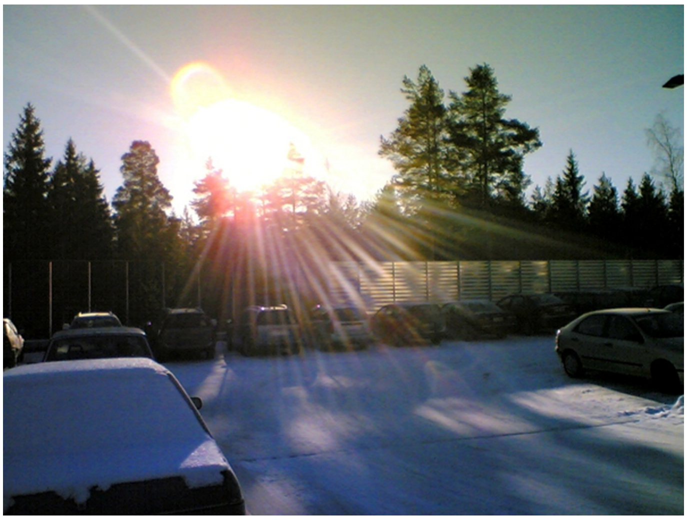


Figure 66 A lens reflection effect caused by sunshine

Examples of good quality images

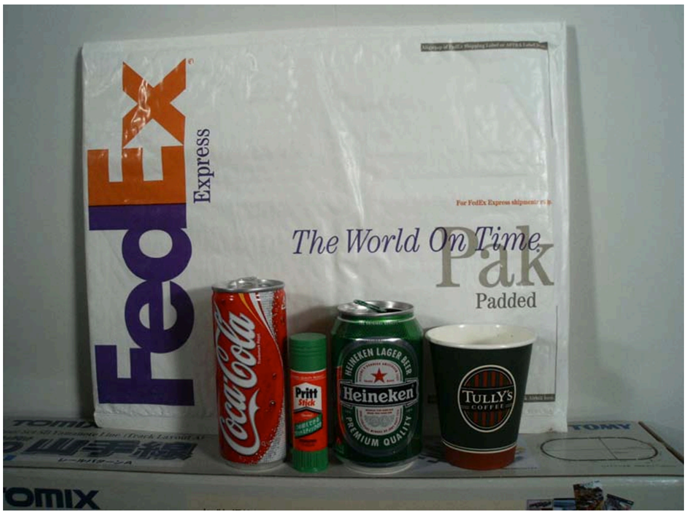


Figure 67 Good image taken indoors

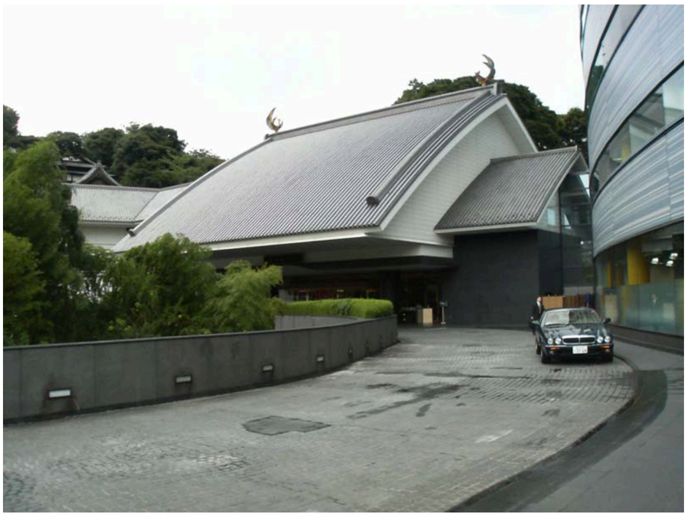


Figure 68 Good image taken outdoors

Main camera construction

This section describes the mechanical construction of the main camera module.

Table 21 Main camera specifications

Sensor type	1/3.2" MOS sensor
Sensor valid pixels	2048 x 1556 (3.2 millions)
F number/Aperture	F3.3 (wide) / F5.9 (tele)
Focal length	4.5 mm (wide) / 12.4 mm (tele) 34.25 - 94.1 mm (35 mm equivalent)
Focus range	10/30 cm to infinity (tele/wide)
Still image resolutions	3Mpixels: 2048 x 1536 (print - high) 2Mpixels: 1600 x 1200 (print - standard) 1.3Mpixels: 1280 x 960 (e-mail) VGA: 640 x 480 (MMS)
Video	640 x 480 to 128 x 96
Video frame rate	30 fps

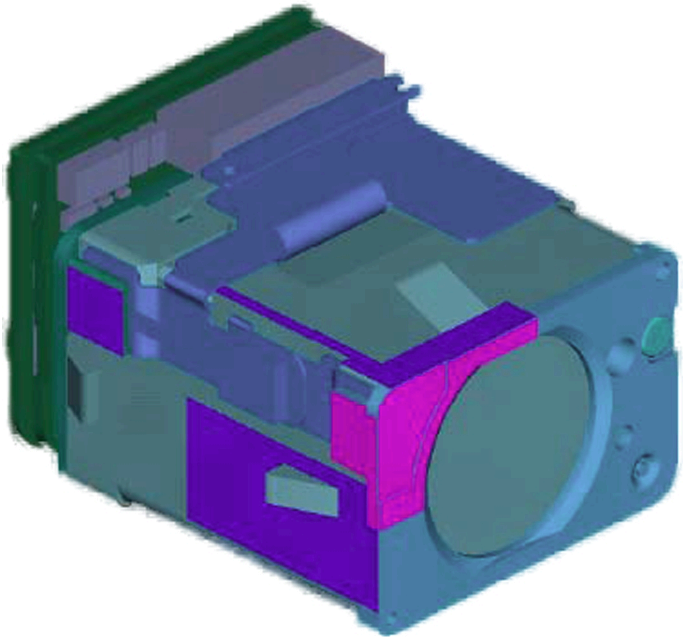


Figure 69 Main camera mechanics

The camera module as a component is not a repairable part, meaning that the components inside the module will not be changed. Cleaning dust from the front face is allowed only. Use clean compressed air.

The camera module uses a socket type connecting. For versioning, laser marked serial numbering is used on the side of the lens housing.

The main parts of the module are:

- 1/3.2" 3M sensor
- Two actuators for AF and optical zoom lens movement
- Lens interface IC
- Camera DSP
- Parallel to CCP1 converter IC
- 50-pin board-to-board connector
- EEPROM: storage for lens characteristic data

Sub camera construction

Table 22 Sub camera specifications

Sensor type	1/7 CMOS sensor
Sensor valid pixels	372 x 292 (109 thousand)
F number	F2.8
Focus range	30cm to infinity
Still image resolutions	352 x 288
Video resolution	352 x 288
Video frame rate	30fps

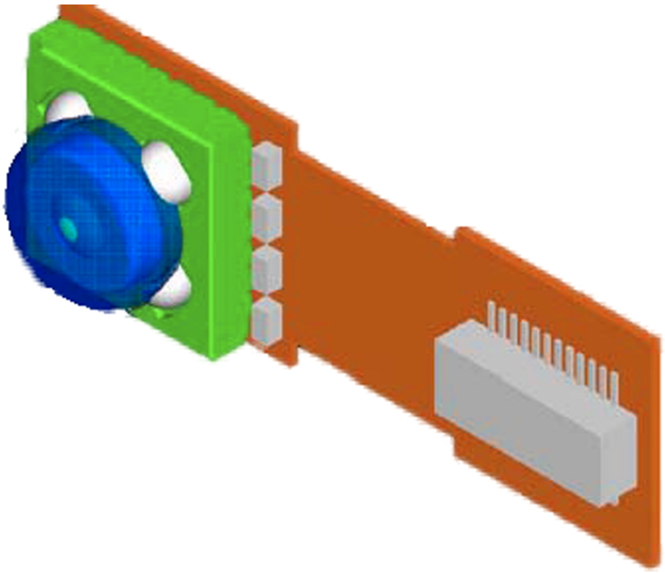


Figure 70 Sub camera mechanics

The sub camera module as a component is not a repairable part, meaning that the components inside the module will not be changed. Cleaning dust from the front face is allowed only. Use clean compressed air.

The main parts of the module are:

- 1/7” CIF CMOS sensor
- 24-pin board-to-board connector
- FPC (Flexible Printed Circuit)
- Passive components

Image quality analysis

Possible faults in image quality

When checking for possible errors in camera functionality, knowing what error is suspected significantly helps the testing by narrowing down the amount of test cases. The following types of image quality problems may be expected to appear:

- Dust (black spots)
- Lack of sharpness
- Bit errors

In addition, there are many other kinds of possibilities for bad image quality, but those are ruled out from the scope of this document since the probability of their appearance is small.

Testing for dust in camera module

Symptoms and diagnosis

For detecting dust problems, take an image of a uniform white surface and analyse it in full resolution. A good quality PC CRT monitor is preferred for analysis (avoid using LCD). Search carefully because finding these defects is not always easy. Figure "Effects of dust on optical path" is an example of an image having easily detectable dust problems.

When taking a white image, use uniformly lightened white paper or white wall. Another option is to use uniform light but in this case make sure that the camera image is not flickering when taking the test image. In case flickering occurs, try to reduce the illumination level. Use JPEG image format for analysing, and set the image quality parameter to ‘High Quality’.

Black spots in an image are caused by dirt particles trapped inside the optical system. Clearly visible and sharp edged black dots in an image are typically dust particles on the image sensor. These spots are searched for in the manufacturing phase, but it is possible that the camera body cavity contains a particle, which may move onto the image sensor active surface, for example, when the phone is dropped. Therefore it is also possible that the problem will disappear before the phone is brought to service. The camera should be replaced if the problem is present when the service technician analyses the phone.

If dust particles are lying on the infrared filter surface on either side, they are hard to locate because they are out of focus, and appear in the image as large, grayish and fading-edge 'blobs'. Sometimes they are invisible to the eye, and the user probably does not notice them at all. However, it is possible that a larger particle disturbs the user, causing need for service.

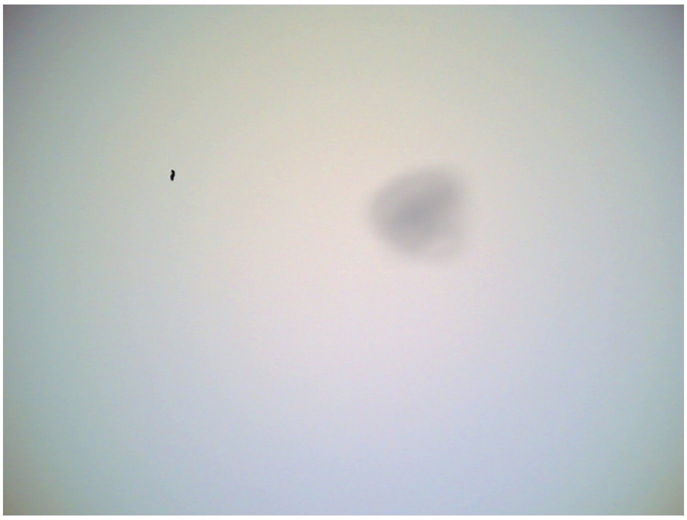


Figure 71 Effects of dust on optical path

If large dust particles get trapped on top of the lens surface in the cavity between the camera window and the lens, they will cause image blurring and poor contrast. If dust stays on the camera module surface, camera cussion, camera bezel or window at assembling, dust may sneak into the optical system as the optical zoom or Auto focus lens moves back and forth. The camera cussion and bezel between the window and the lens unit or camera module should prevent any particles from getting into the cavity after the manufacturing phase.

If dust particles are found on the sensor, this is classified as a manufacturing error of the module, and the camera should be replaced. Any particles inside the cavity between the protection window and the lens have most probably been trapped there in the assembly phase at a Nokia factory. Unauthorized disassembling of the product can also be the root of the problem. However, in most cases it should be possible to remove the particle(s) by using clean compressed air. Never wipe the lens surface before trying compressed air; the possibility of damaging the lens is substantial. Always check the image sharpness after removing dust.

Testing camera image sharpness

Symptoms and diagnosis

If pictures taken with a device are claimed to be blurry, there are five possible sources for the problem:

1 The protection window is fingerprinted, soiled, dirty, visibly scratched or broken.

2 The camera module has failed to focus correctly, producing a blurred image.

3 User has tried to take pictures containing their intended objects, and the images are blurred or not focused in their intended object. Auto focus is calculated in the center of the image and locked by a half press of the shutter button. If the focus is not locked at the user's intended object, the object in the reproduced image is blurred or not focused well. This is not a cause to replace camera module.

4 Sharpness of the images are different depending on the zoom ratio and sharpness in the image is different depending on the location (center to corners), which is a nature of lens unit productions and controlled within a reasonable variations. This is not a cause to replace camera module.

5 User has tried to take pictures and images are blurred due to handshake, shutter button pressing, dark conditions or carelessness.

6 There is dirt between the protection window and the camera lens.

7 The protection window is defective. This can be either a manufacturing failure or caused by the user. The window should be changed.

A quantitative analysis of sharpness is very difficult to conduct in any other environment than optics laboratory. Therefore, subjective analysis should be used.

If no visible defects (items 1-4) are found, a couple of test images should be taken. Generally, a well-illuminated typical indoor scene, such as the one in Figure "Good image taken indoors", can be used as a target. The main considerations are:

- The camera module has to be given time to focus correctly. Correct focusing is normally indicated with a flashing icon or green bracket in the viewfinder. During focusing, the image in the viewfinder moves slightly back and fourth, this is normal and shows that the lens unit is moving. During the movement a faint sound can be heard from the camera head.
- The protection window has to be clean.
- The amount of light (300 – 600 lux (bright office lighting)) is sufficient.
- The scene should contain, for example, small objects for checking sharpness. Their distance should be 1 – 2 meters.
- The focus should be locked to the object containing edges or textures by pointing the object in the center of the image.
- If possible, compare the image to another image of the same scene, taken with a different device. Note that the reference device has to be a similar Nokia phone.

There are several conditions in which AF operation is challenging for the camera module, i.e. failing from time to time. These include:

- Low light scenes and night mode
- Scenes with low contrast
- Short distance to object (less than 30 cm)
- Fast-moving objects

Under low light and night mode the AF function is slower than under good light, it may even fail to find correct focus position. Low contrast scenes or fast moving objects may also slow down or cause AF to fail. This is normal operation, and is not a cause to replace camera.

The operation of AF can be tested by taking images of objects at different distances. Good distances are 30 cm, 60 cm and infinity (>3 m). Any LED or xenon flashes should not be used while taking the images.

The taken images should be analysed on PC screen with full screen. Pay attention to the computer display settings; at least 65000 colours (16-bit) have to be used. 256 (8-bit) colour setting is not sufficient, and true colour (24 bit, 16 million colours) or 32-bit (full colour) setting is recommended.

If the differences are noticeable at a glance and also if the one under investigation is significantly inferior, the module might have a faulty lens. In this case, the module should be changed. Always recheck the resolution after changing the camera module. If a different module produces a clearly noticeable quality gap, the fault is probably in the camera window. Check the window by looking carefully through it when replacing the module. As references Figure "Good image taken indoors" and Figure "Good image taken outdoors" can be used. Another possibility is to use a service point comparison phone, if available.

Dirty camera lens protection window

The following series of images demonstrates the effects of fingerprints on the camera protection window.

It should be noted that the effects of any dirt in images can vary much. It may be difficult to judge whether the window has been dirty or if something else is wrong. Therefore, the cleanness of the protection window should always be checked and the window should be wiped clean with a suitable cloth.

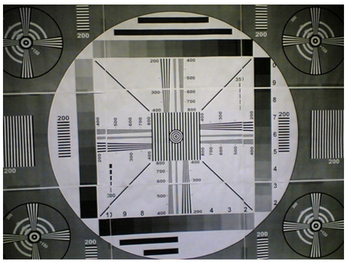


Figure 72 Image taken with clean protection window

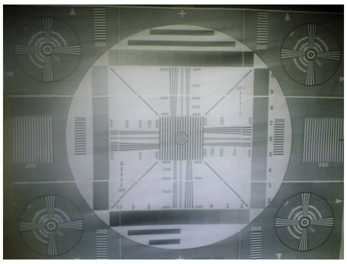


Figure 73 Image taken with greasy protection window

Image bit errors

Bit errors are image defects caused by data transmission errors between the camera module and the phone baseband and/or errors inside the module.

Usually bit errors can be easily detected in images, and they are best visible in full resolution images. A good practice is to use a uniform white test target when analysing these errors. The errors are clearly visible, colourful sharp dots or lines in camera images. See the following figure.

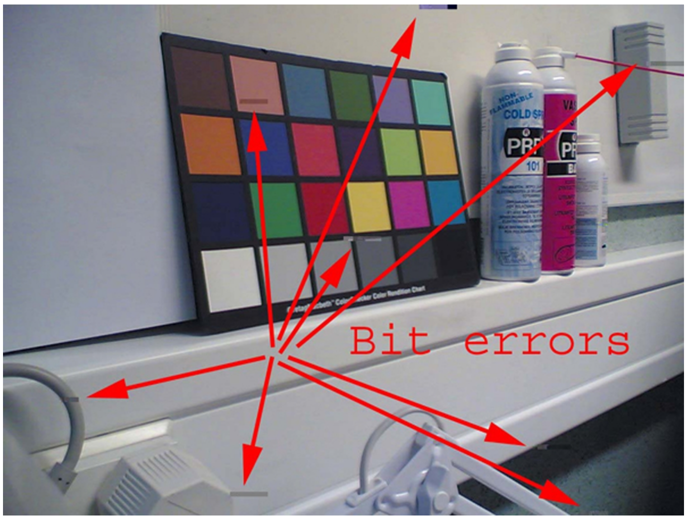


Figure 74 Bit errors caused by JPEG compression

One type of bit error is a lack of bit depth. In this case, the image is almost totally black under normal conditions, and only senses something in very highly illuminated environments. Typically this is a contact problem between the camera module and the phone main PWB. You should check the camera assembly and connector contacts.

If the fault is in the camera module, bit errors are typically visible only when using some specific image resolution. For example, in case of a viewfinder fault, the error might exist but is not visible in a full size image.

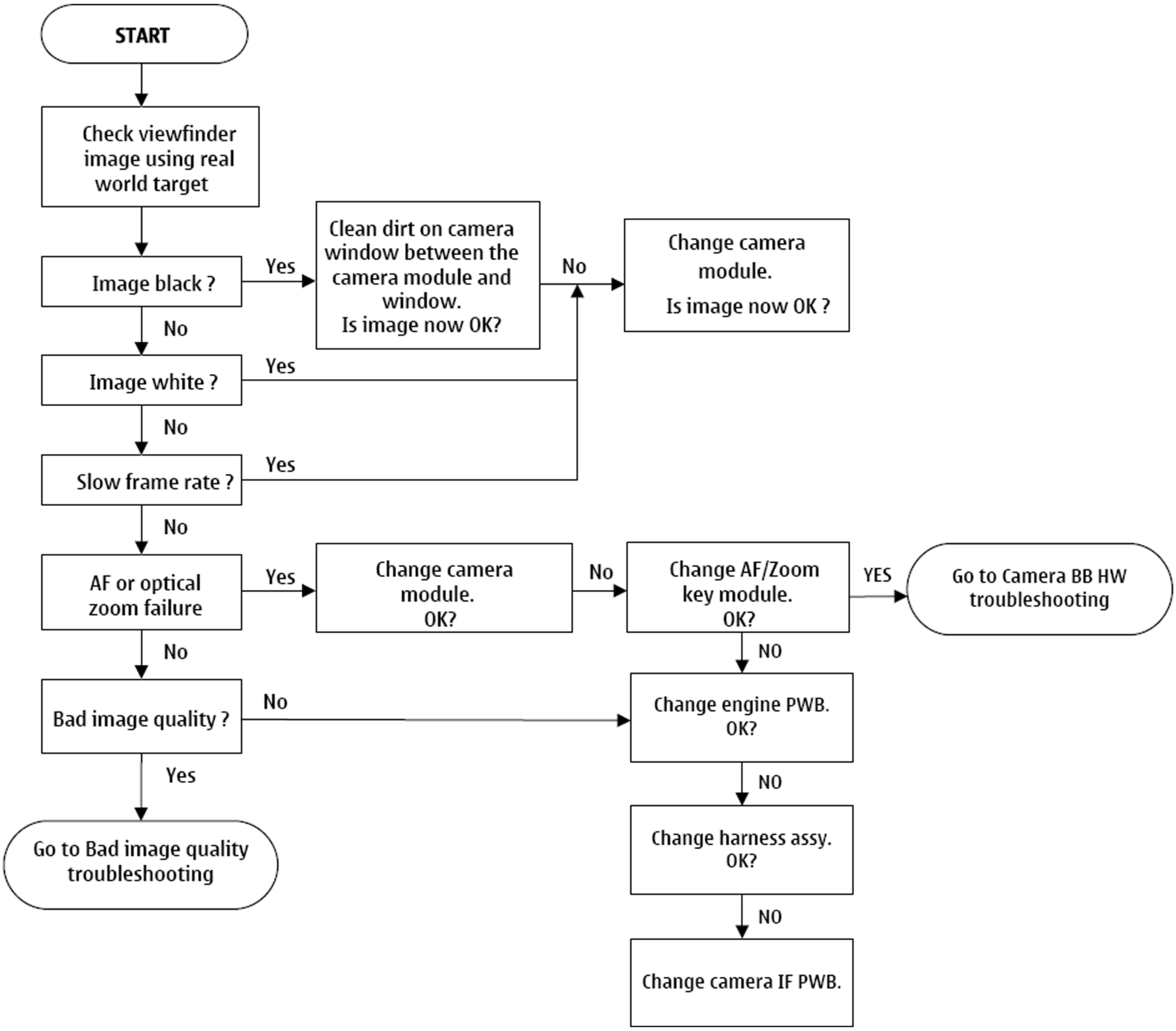
> **Note:** At the most 5 clusters of black dots or blemish are not considered errors, and no reason to replace camera module

Camera troubleshooting flowcharts

Main camera troubleshooting

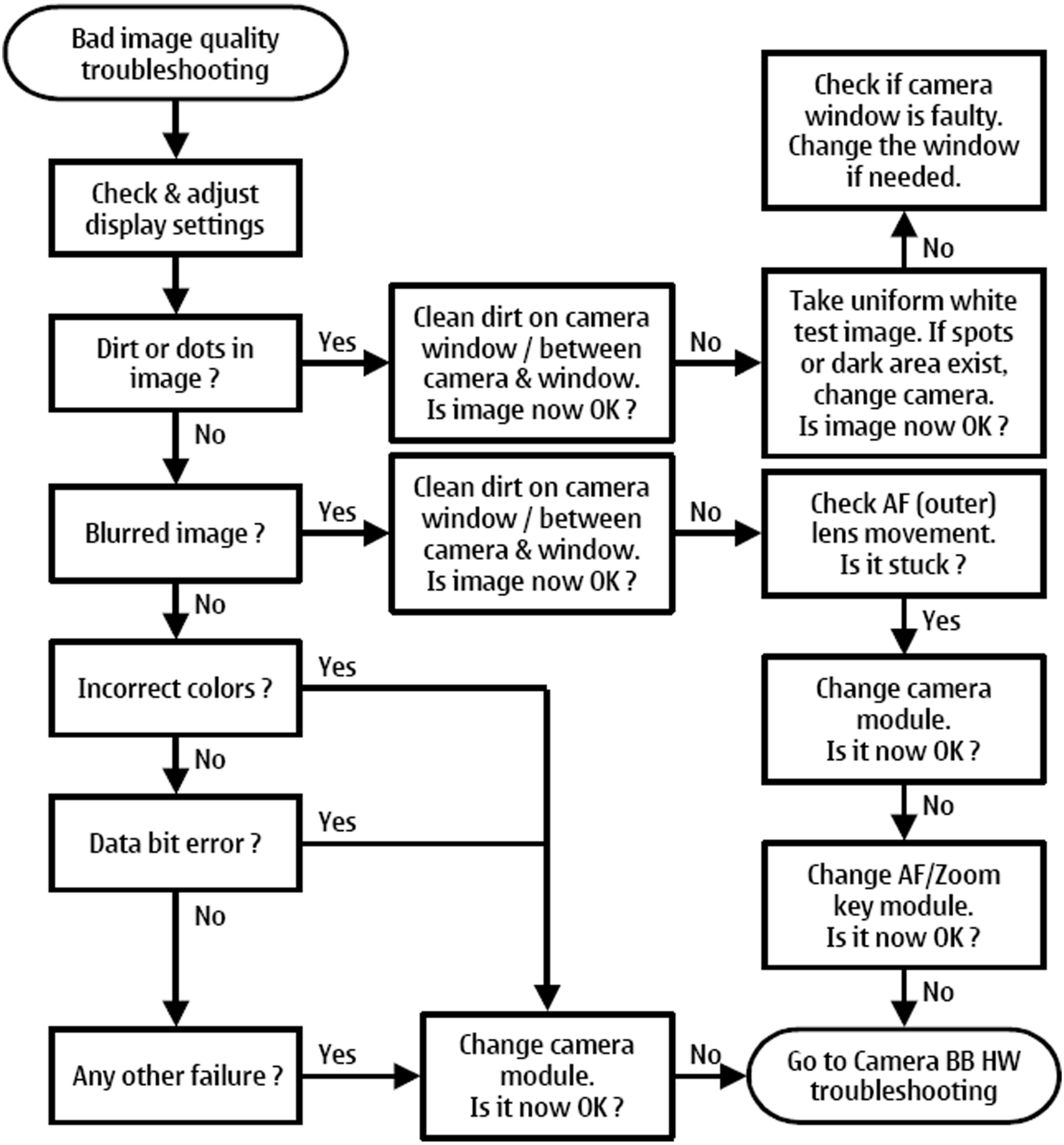
Camera viewfinder troubleshooting

Troubleshooting flow


START
Check viewfinder image using real world target
Image black ?
Yes
Clean dirt on camera window between the camera module and window. Is image now OK?
No
Change camera module. Is image now OK ?
No
Image white ?
Yes
No
Slow frame rate ?
Yes
No
AF or optical zoom failure
Yes
Change camera module. OK?
No
Change AF/Zoom key module. OK?
YES
Go to Camera BB HW troubleshooting
NO
No
Bad image quality ?
No
Change engine PWB. OK?
NO
Yes
Go to Bad image quality troubleshooting
Change harness assy. OK?
NO
Change camera IF PWB.

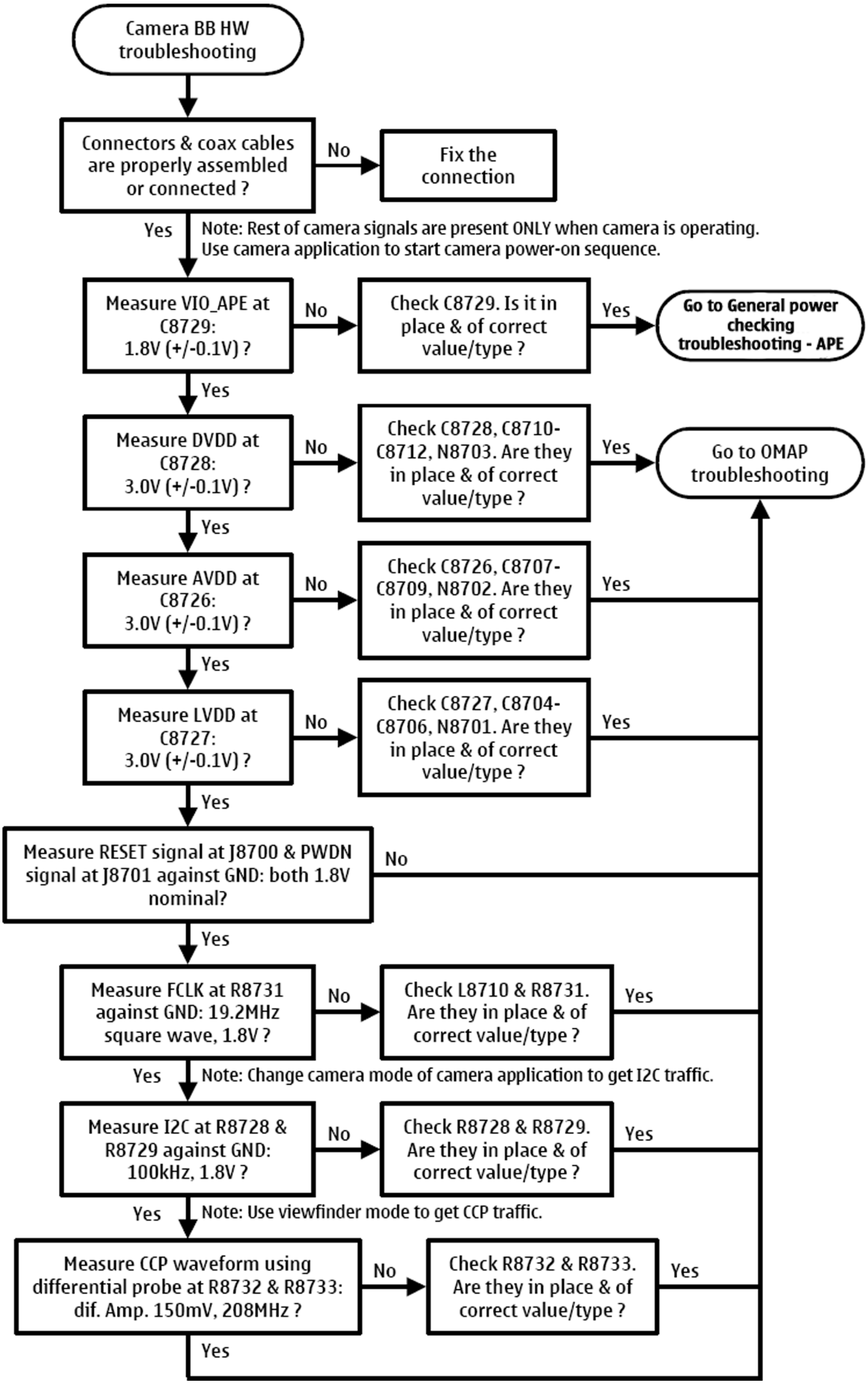
Bad image quality troubleshooting

Troubleshooting flow


Bad image quality troubleshooting
Check & adjust display settings
Dirt or dots in image ?
Yes
Clean dirt on camera window / between camera & window. Is image now OK ?
No
Take uniform white test image. If spots or dark area exist, change camera. Is image now OK ?
No
Check if camera window is faulty. Change the window if needed.
No
Blurred image ?
Yes
Clean dirt on camera window / between camera & window. Is image now OK ?
No
Check AF (outer) lens movement. Is it stuck ?
Yes
Change camera module. Is it now OK ?
No
Change AF/Zoom key module. Is it now OK ?
No
No
Incorrect colors ?
Yes
No
Data bit error ?
Yes
No
Any other failure ?
Yes
Change camera module. Is it now OK ?
No
Go to Camera BB HW troubleshooting

Camera baseband HW troubleshooting

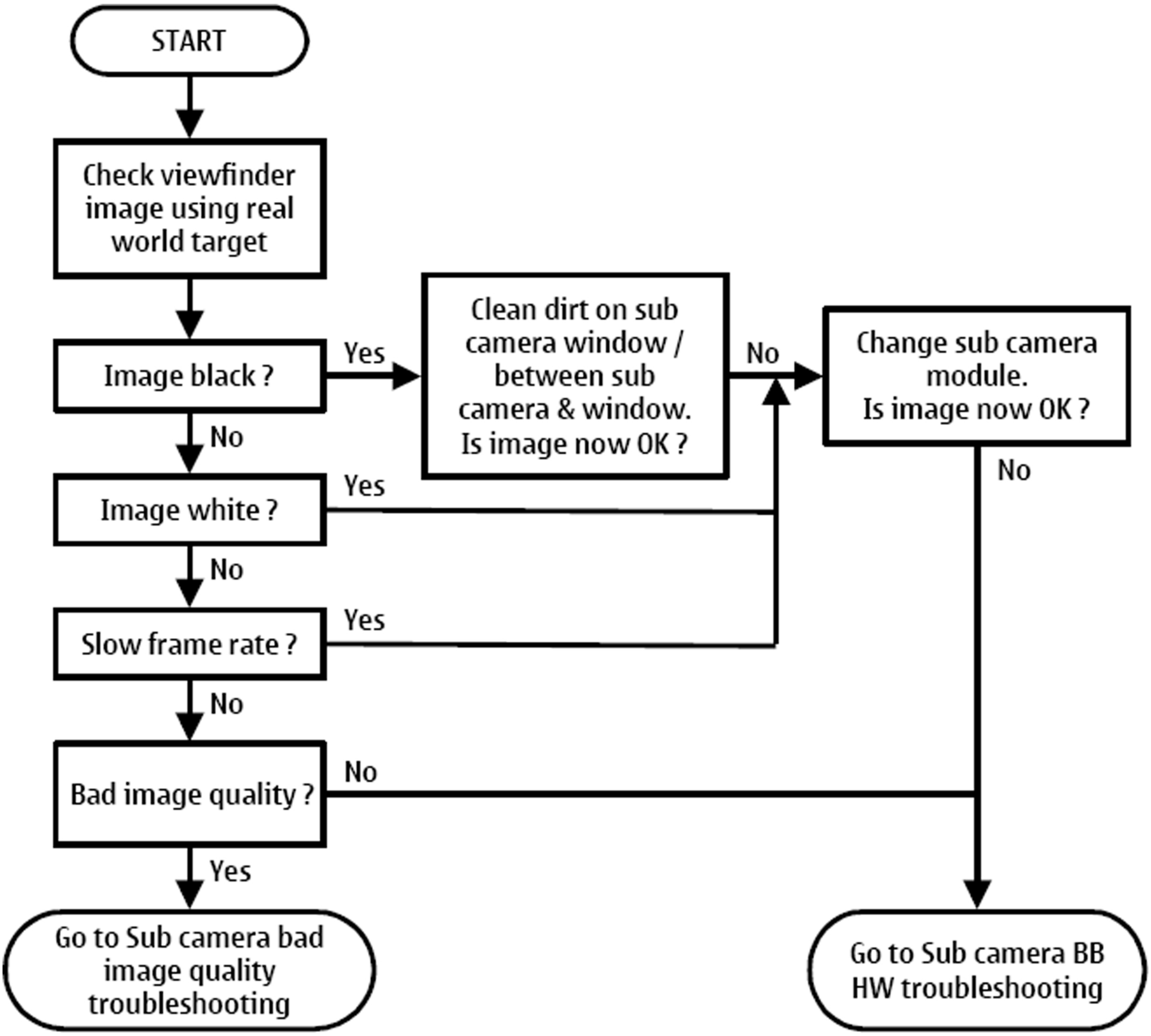
Troubleshooting flow


Camera BB HW troubleshooting
Connectors & coax cables are properly assembled or connected ?
No
Fix the connection
Yes
Note: Rest of camera signals are present ONLY when camera is operating. Use camera application to start camera power-on sequence.
Measure VIO_APE at C8729: 1.8V (+/-0.1V) ?
No
Check C8729. Is it in place & of correct value/type ?
Yes
Go to General power checking troubleshooting - APE
Yes
Measure DVDD at C8728: 3.0V (+/-0.1V) ?
No
Check C8728, C8710-C8712, N8703. Are they in place & of correct value/type ?
Yes
Go to OMAP troubleshooting
Yes
Measure AVDD at C8726: 3.0V (+/-0.1V) ?
No
Check C8726, C8707-C8709, N8702. Are they in place & of correct value/type ?
Yes
Yes
Measure LVDD at C8727: 3.0V (+/-0.1V) ?
No
Check C8727, C8704-C8706, N8701. Are they in place & of correct value/type ?
Yes
Yes
Measure RESET signal at J8700 & PWDN signal at J8701 against GND: both 1.8V nominal?
No
Yes
Measure FCLK at R8731 against GND: 19.2MHz square wave, 1.8V ?
No
Check L8710 & R8731. Are they in place & of correct value/type ?
Yes
Yes
Note: Change camera mode of camera application to get I2C traffic.
Measure I2C at R8728 & R8729 against GND: 100kHz, 1.8V ?
No
Check R8728 & R8729. Are they in place & of correct value/type ?
Yes
Yes
Note: Use viewfinder mode to get CCP traffic.
Measure CCP waveform using differential probe at R8732 & R8733: dif. Amp. 150mV, 208MHz ?
No
Check R8732 & R8733. Are they in place & of correct value/type ?
Yes
Yes

Sub camera troubleshooting

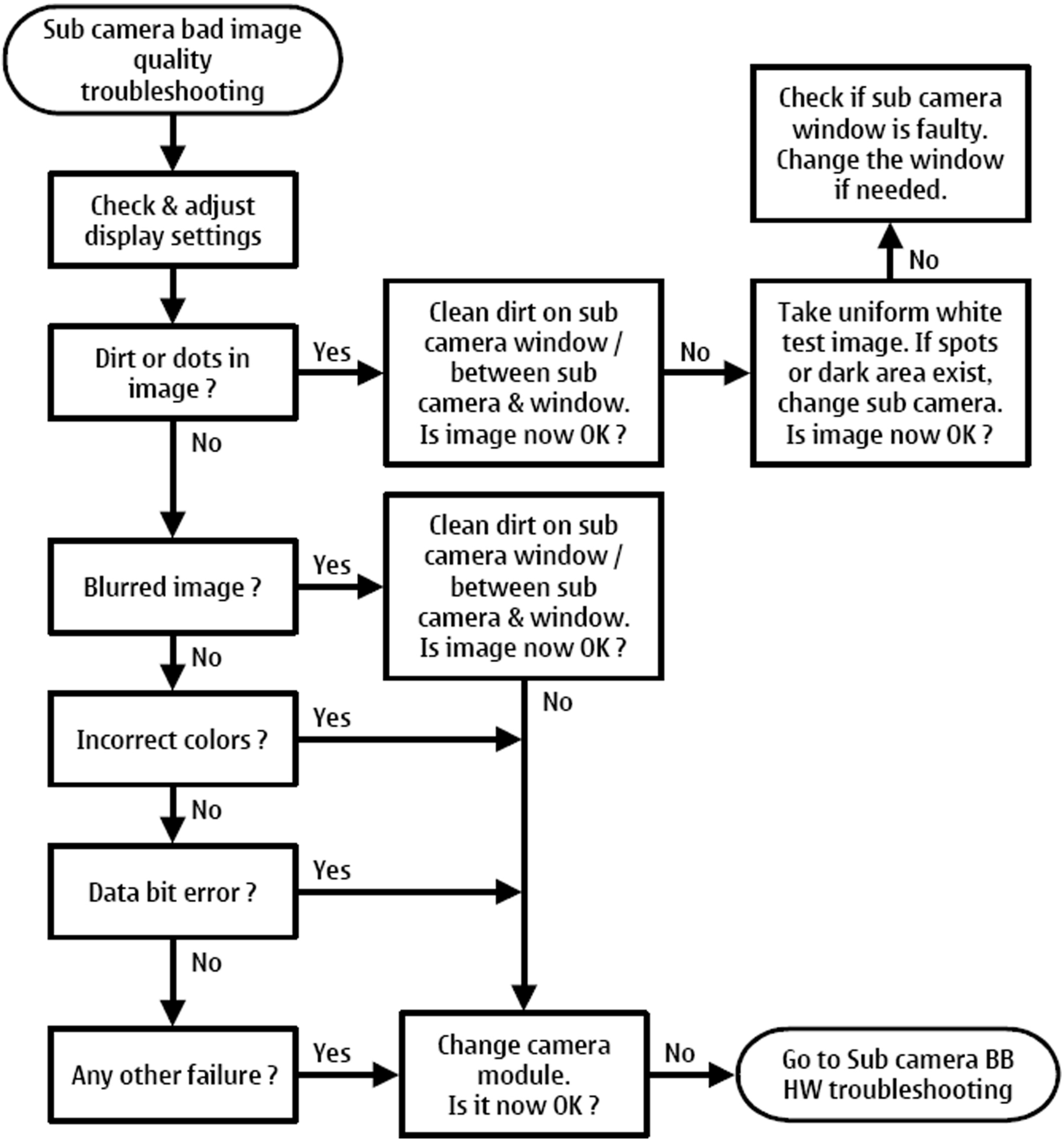
Sub camera viewfinder troubleshooting

Troubleshooting flow


START
Check viewfinder image using real world target
Image black ?
Yes
Clean dirt on sub camera window / between sub camera & window. Is image now OK ?
No
Change sub camera module. Is image now OK ?
No
No
Image white ?
Yes
No
Slow frame rate ?
Yes
No
Bad image quality ?
No
Yes
Go to Sub camera bad image quality troubleshooting
Go to Sub camera BB HW troubleshooting

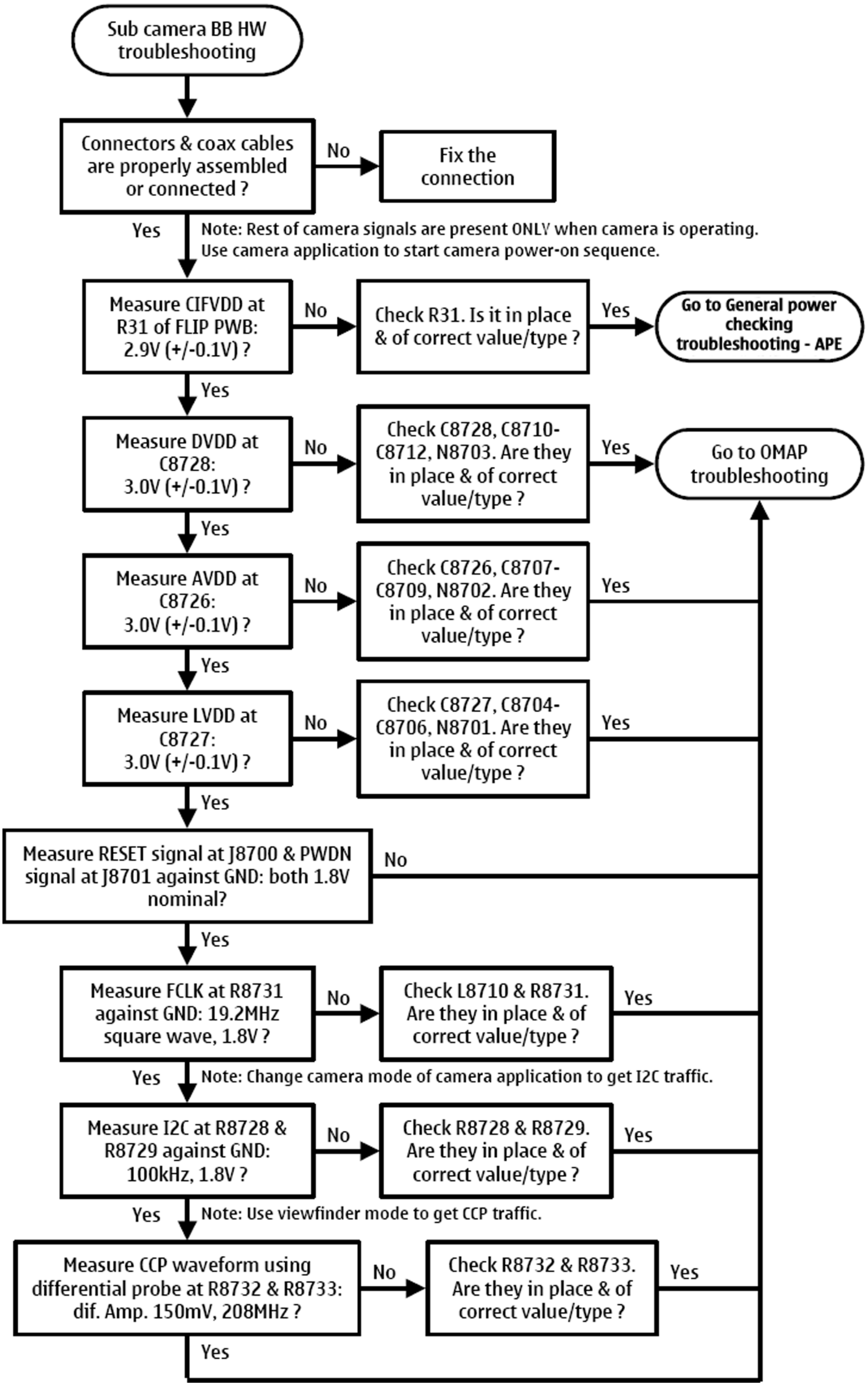
Bad image quality troubleshooting

Troubleshooting flow


Sub camera bad image quality troubleshooting
Check & adjust display settings
Dirt or dots in image ?
Yes
Clean dirt on sub camera window / between sub camera & window. Is image now OK ?
No
Take uniform white test image. If spots or dark area exist, change sub camera. Is image now OK ?
No
Check if sub camera window is faulty. Change the window if needed.
No
Blurred image ?
Yes
Clean dirt on sub camera window / between sub camera & window. Is image now OK ?
No
No
Incorrect colors ?
Yes
No
Data bit error ?
Yes
No
Any other failure ?
Yes
Change camera module. Is it now OK ?
No
Go to Sub camera BB HW troubleshooting

Sub camera baseband HW troubleshooting

Troubleshooting flow


Sub camera BB HW troubleshooting
Connectors & coax cables are properly assembled or connected ?
No
Fix the connection
Yes
Note: Rest of camera signals are present ONLY when camera is operating. Use camera application to start camera power-on sequence.
Measure CIFVDD at R31 of FLIP PWB: 2.9V (+/-0.1V) ?
No
Check R31. Is it in place & of correct value/type ?
Yes
Go to General power checking troubleshooting - APE
Yes
Measure DVDD at C8728: 3.0V (+/-0.1V) ?
No
Check C8728, C8710-C8712, N8703. Are they in place & of correct value/type ?
Yes
Go to OMAP troubleshooting
Yes
Measure AVDD at C8726: 3.0V (+/-0.1V) ?
No
Check C8726, C8707-C8709, N8702. Are they in place & of correct value/type ?
Yes
Yes
Measure LVDD at C8727: 3.0V (+/-0.1V) ?
No
Check C8727, C8704-C8706, N8701. Are they in place & of correct value/type ?
Yes
Yes
Measure RESET signal at J8700 & PWDN signal at J8701 against GND: both 1.8V nominal?
No
Yes
Measure FCLK at R8731 against GND: 19.2MHz square wave, 1.8V ?
No
Check L8710 & R8731. Are they in place & of correct value/type ?
Yes
Yes
Note: Change camera mode of camera application to get I2C traffic.
Measure I2C at R8728 & R8729 against GND: 100kHz, 1.8V ?
No
Check R8728 & R8729. Are they in place & of correct value/type ?
Yes
Yes
Note: Use viewfinder mode to get CCP traffic.
Measure CCP waveform using differential probe at R8732 & R8733: dif. Amp. 150mV, 208MHz ?
No
Check R8732 & R8733. Are they in place & of correct value/type ?
Yes
Yes

Flash LED troubleshooting

Introduction to flash LED troubleshooting

A fault or complaint associated to LED flash operation can be roughly categorized into two subgroups:

1. Flash is not functional at all (no light output at all).
2. Images can be taken and they are recognizable but for some reason the quality of images is degraded.

   Examples of quality degradations:

   - Brightness is not sufficient.
   - Brightness is too much = overexposed.
   - Only portions of the image brightness (e.g., left, right, top or bottom) are proper and the rest are not.

The quality of an image is very difficult to measure quantitatively, and even comparative measurements are difficult (comparing two images), if the difference between reference images is small. If a user is not satisfied with his/her device's image quality, it is fairly difficult to accurately test the device and get an exact result, which would tell if the device is working properly.

Often subjective evaluation has to be used for finding out if there is something wrong in the flash. Some training or experience of a correctly operating reference device may be needed in order to detect possible faults. It is easy for a user to take low quality images in bad conditions. Therefore, the camera and flash operation has to be always checked in constant conditions (lighting, temperature) or by using a second, known-to-be good reference device.

Flash LED and image taking conditions

This section describes some of common factors, which may cause poor image quality if not taken into account by end users when taking pictures, and may therefore result in complaints. The items described are normal to the camera and LED flash operation and do not raise a need for servicing the components.

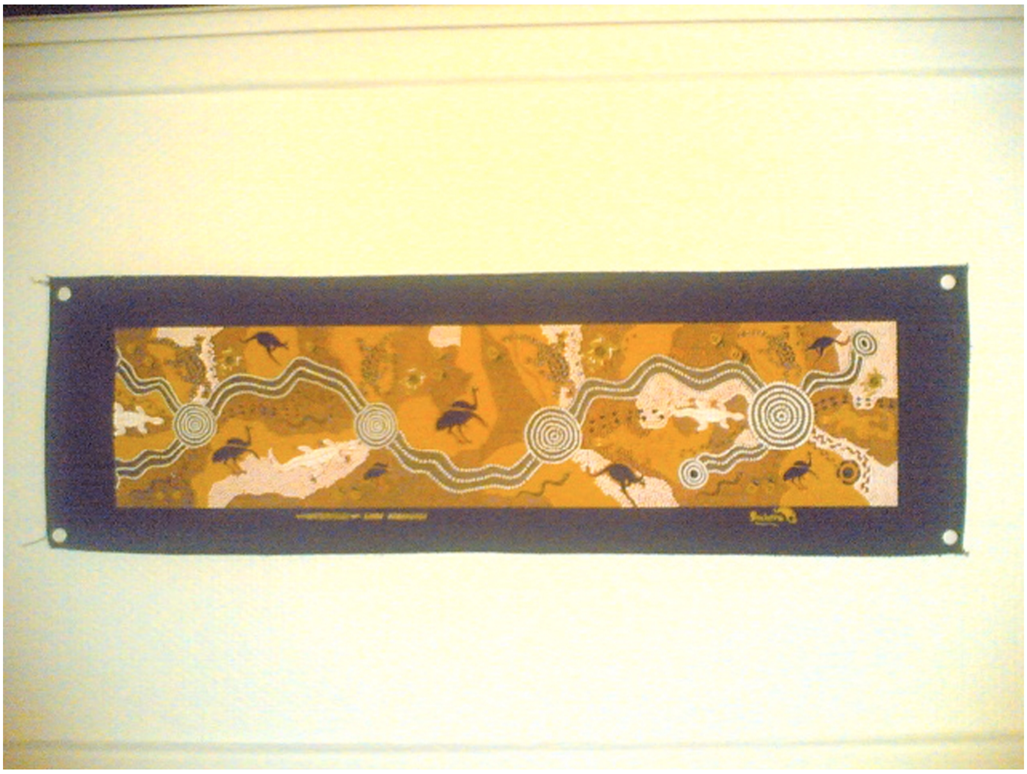


Figure 75 Example of a good quality image taken with the flash LED

Distance to the target (too close)

There is no feedback in the flash system, which means that the light output is constant in every situation. This causes the images to overexposure, when shot from close distance. The flash LED is designed to work optimally between distances of 70 cm – 1.2 m.

This is normal behaviour; do not change the flash module.

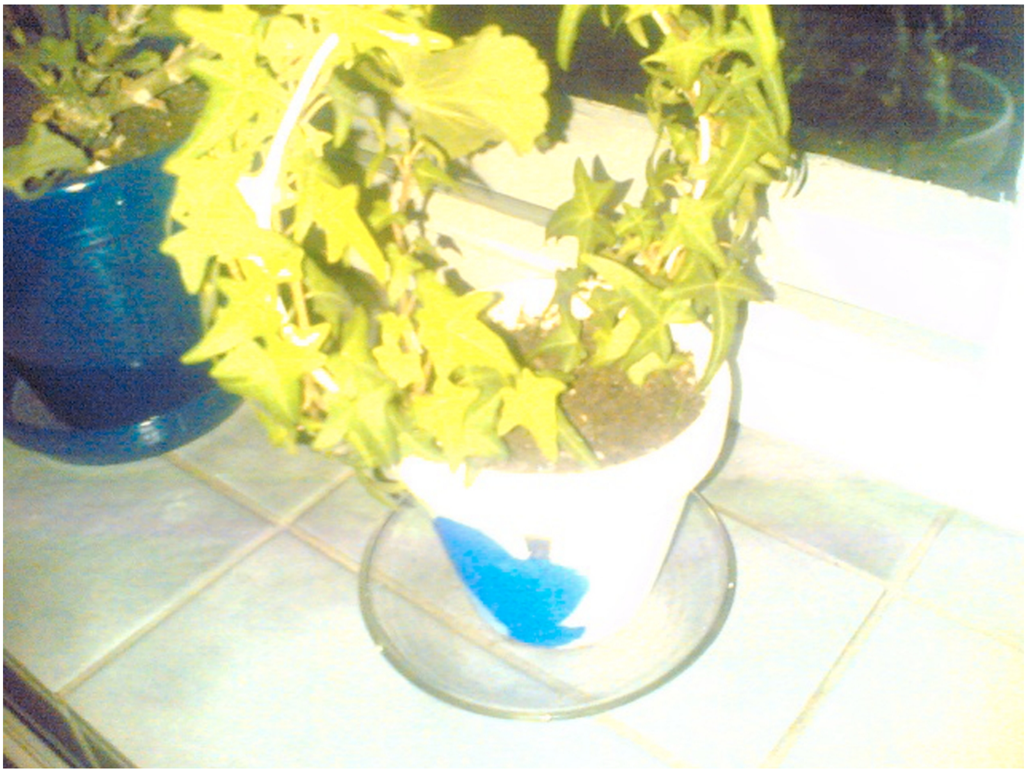


Figure 76 overexposed image

Distance to the target (too far away):

The power of the white LED flash is still very modest compared to xenon flash technology. Even with full power, the maximum distance for an acceptable image quality is roughly 1.2 m. If the distance is greater than 1.2 m, the images will appear dark and the noise level increases.

This is normal behaviour; do not change the flash module.

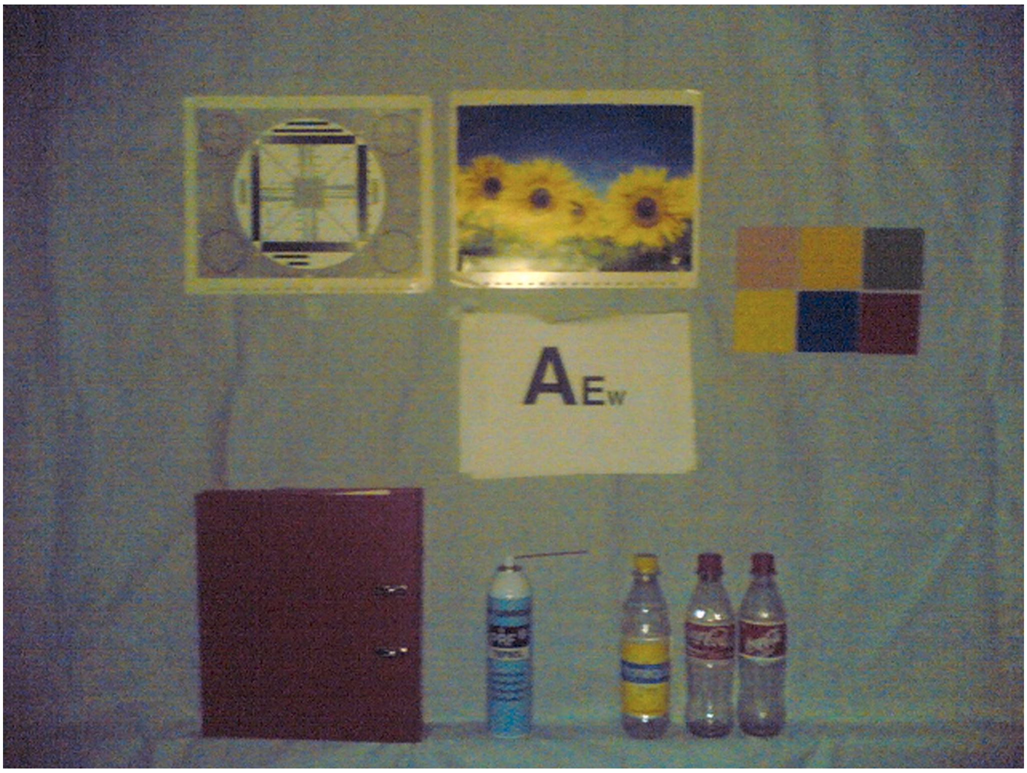


Figure 77 Dark and noisy image

Shaken (= blurred) images

The traditional xenon flash has the advantage of stopping the movement. This is a result of an extremely short and intense light pulse, which makes it possible for a camera to use very short exposure time. Due to the weak output of the LED flash, the exposure time has to be actually increased in the viewfinder mode in total blackness, instead of shortening it. This allows the sensor to integrate longer and collect more light but this also easily creates blurred images if care is not taken.

In addition to the limitation due to small LED flash light, handshake owing to camcoder type product concept and shutter button operation exists. These are not errors but a limitation of the product. No need to change the LED flash module.

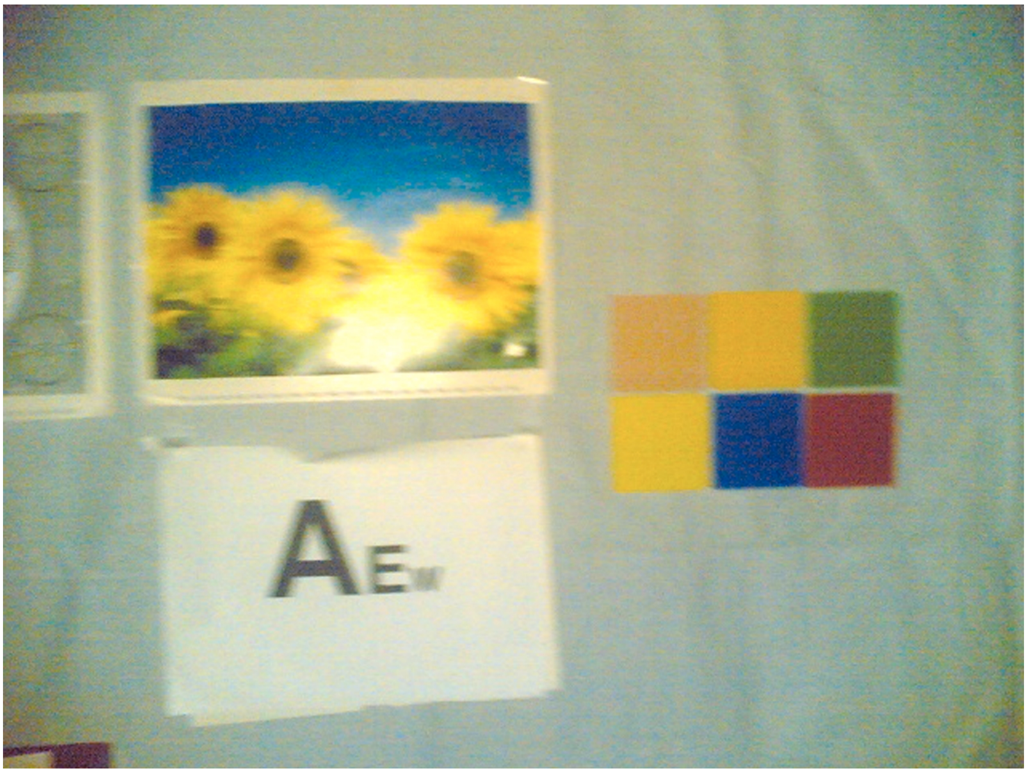


Figure 78 Shaken image

Camera white balance failure and overexposure due to presence of ambient light

Because the spectral output of the flash is known, the white balance and the exposure control of the camera work in optimal way with the flash in total blackness. This is why some of the pictures may fail (i.e. images get a bit yellow or reddish, or greenish or bluish, depending on the ambient light characteristics, as well as overexposed or underexposed).

If the flash works correctly in dark conditions, there is no need to change the flash module.

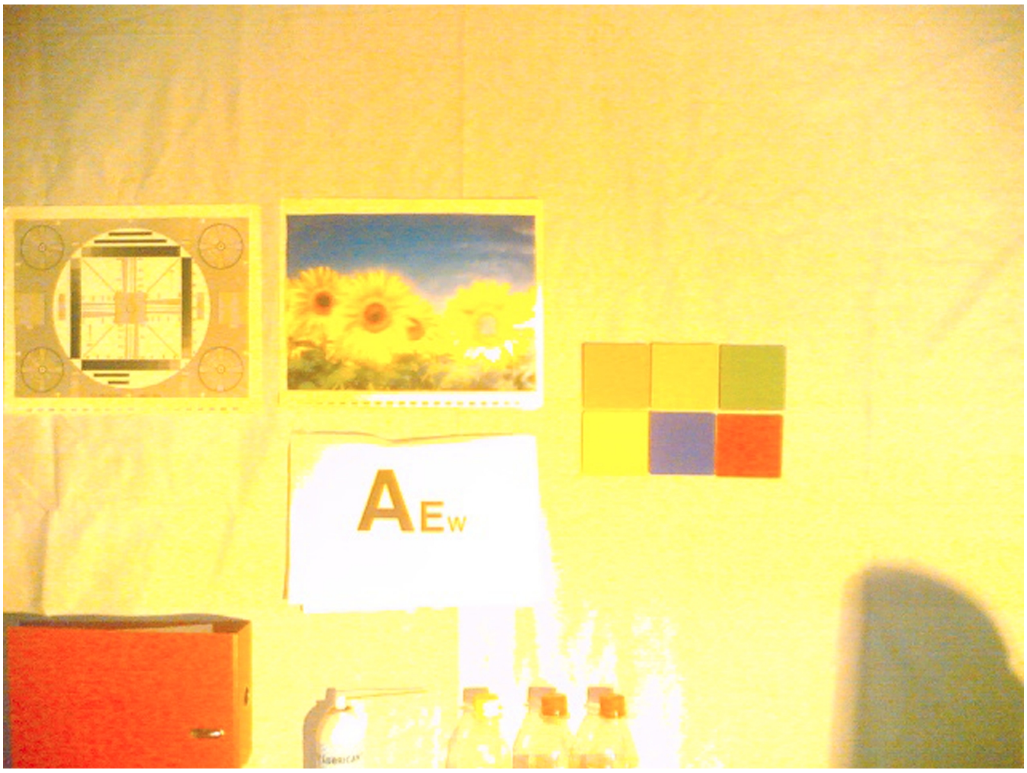


Figure 79 Camera white balance failure and overexposure

Colour difference between different modules

There is some variation in the spectrum of the flash, which derives from the manufacturing process of the white LEDs. Because of this variation, there may be some variation in the colour of the images as well.

This is normal behaviour; do not change the flash module.

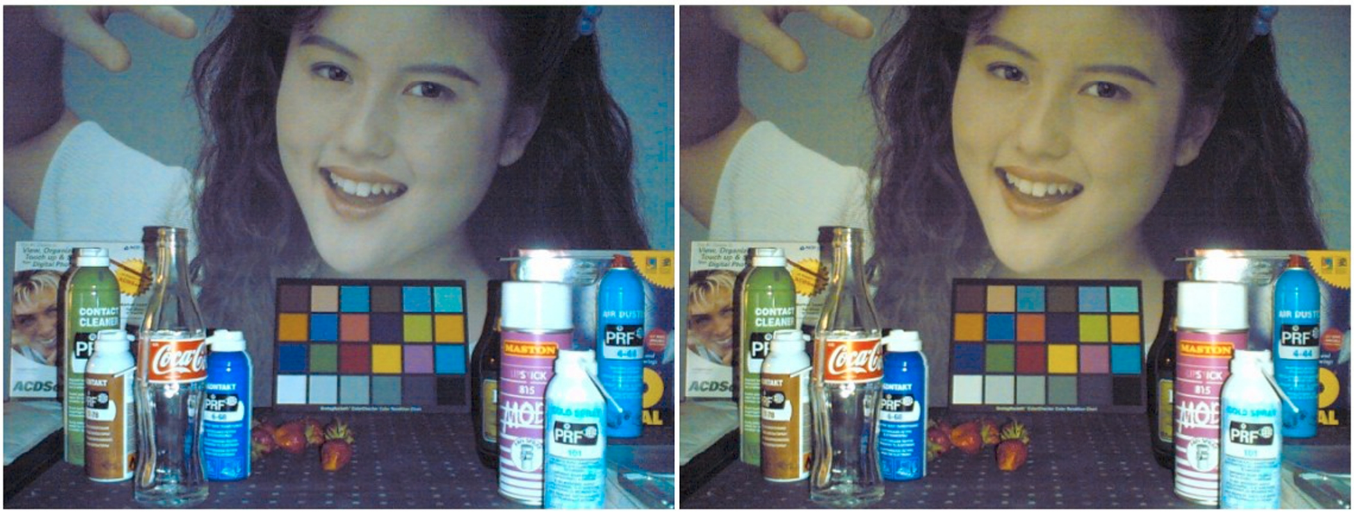


Figure 80 Color difference between flash colour limit samples

Flash LED overview

Table 23 Flash LED module specifications

Type	White Light Emitting Diode
Material	GaN

Structure	4 chips in 1 package
Forward Voltage VF	3.3 V (typ at IFDC=20mA/chip)
Luminance Intensity	5000 mcd (typ at IFDC=20mA/chip)

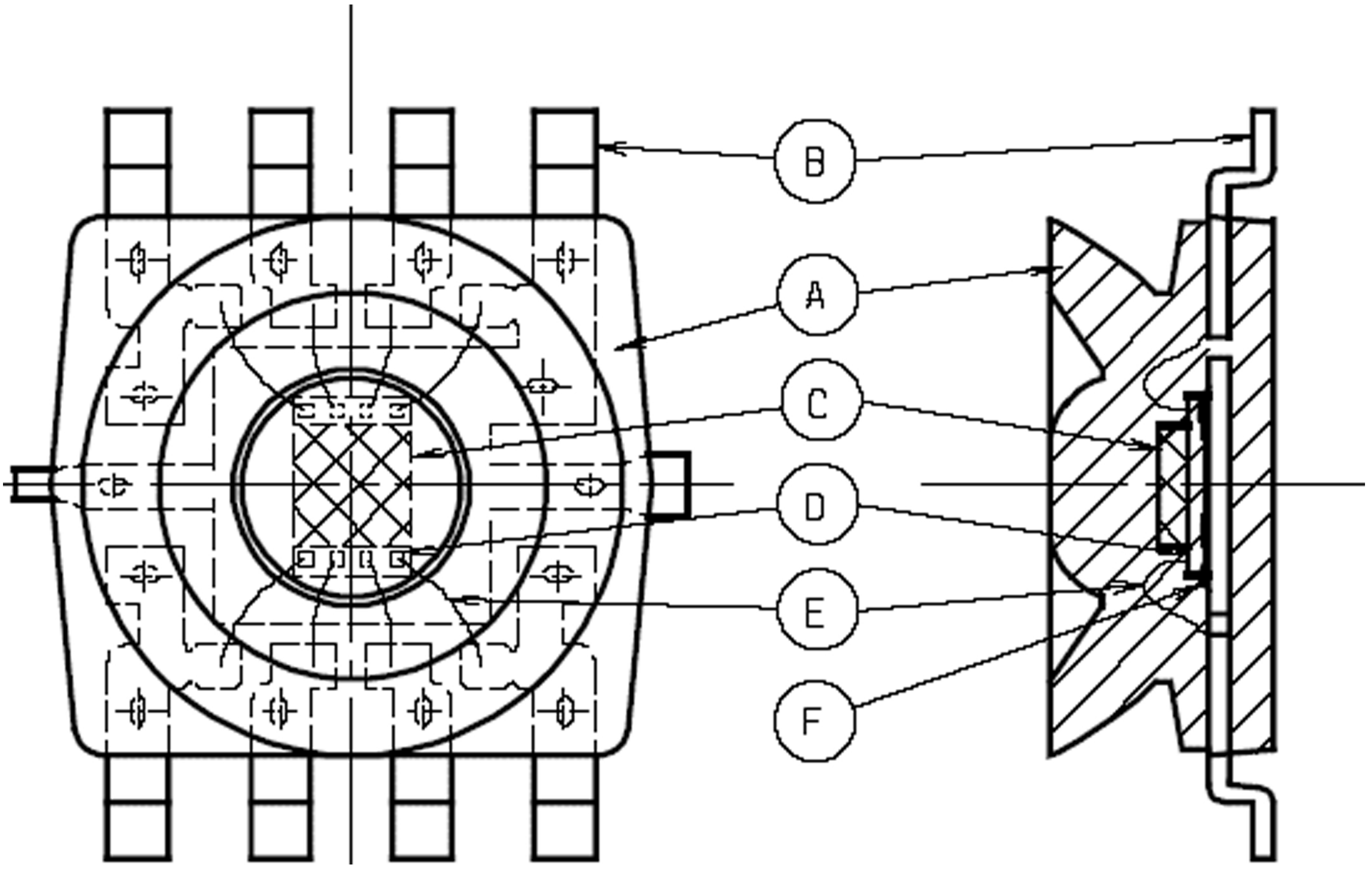


Figure 81 Flash LED mechanics

The flash LED module is not a repairable part, meaning that the components or parts in the module cannot be changed. Only cleaning dust from the lens is allowed; use clean compressed air. The flash LED is soldered to flex-area of the UI PWB.

The main parts of the module are:

- Housing (A)
- Lead frame (B)
- LED chip (C), which is soldered to the PWB
- Zener diode (D), which is ESD protection part
- Au wire (E)
- Paste (F)

Image quality analysis

Possible faults in image quality

When checking for possible errors in the flash functionality, knowing what error is suspected, significantly helps the testing by narrowing down the number of possible test cases. The following types of image quality problems may be expected to appear:

- LED module is not flashing at all
- Image colours are not good
- Flash power is weak

Testing flash module functionality

Context

With the help of this test you can check the flash module's overall functionality.

Always set the flash to FORCED FLASH mode when performing the test. The FORCED FLASH mode enforces the LED module to flash, even if there is some ambient light present.

Steps

1. Take an image with the flash and monitor at same time whether the LED module flashes.

Results

If the LED flashes normally, the overall functionality of the module is OK.

Testing image colours with flash

Context

With the help of this test you can check if the image colours are normal when using the flash.

Steps

1. Take an image of a target, which contains something white in total blackness from less than 1 m range.

Results

If the white target appears to be white, the flash is working correctly. However, remember that there is some variation in the flash colour from module to module.

Testing flash power

Context

With the help of this test you can check if the flash is working with adequate power level.

Steps

1. Take an image with the flash in total blackness (ambient light <1 lux) of a target 80 cm - 1 m away.

Results

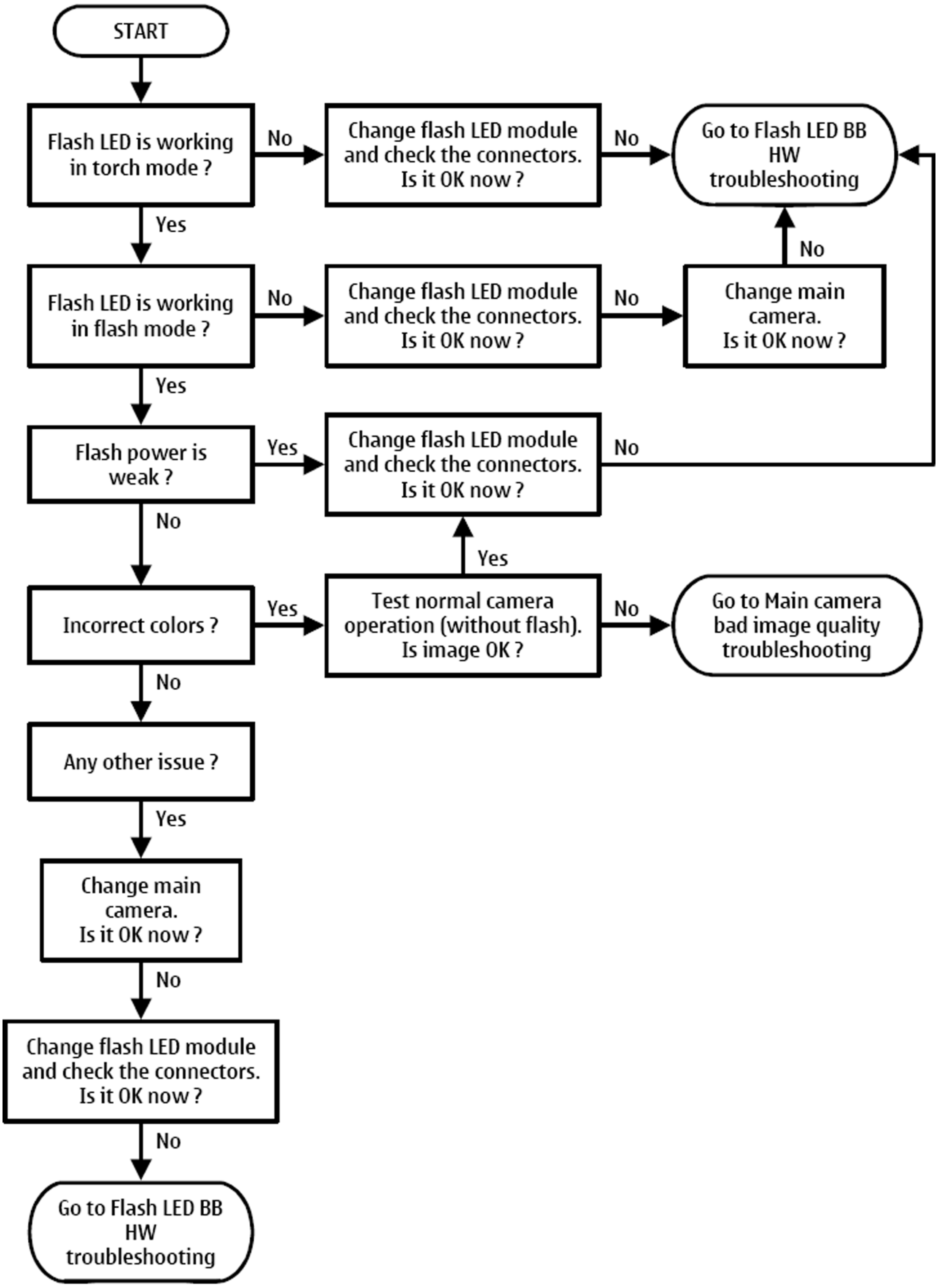
If the flash is working normally with adequate power level, the image is correctly exposed between distances 80 cm to 1 m.

Remember that the brightness level in the corners is always less than in the center of the image because of camera and flash optics.

Flash LED troubleshooting flowcharts

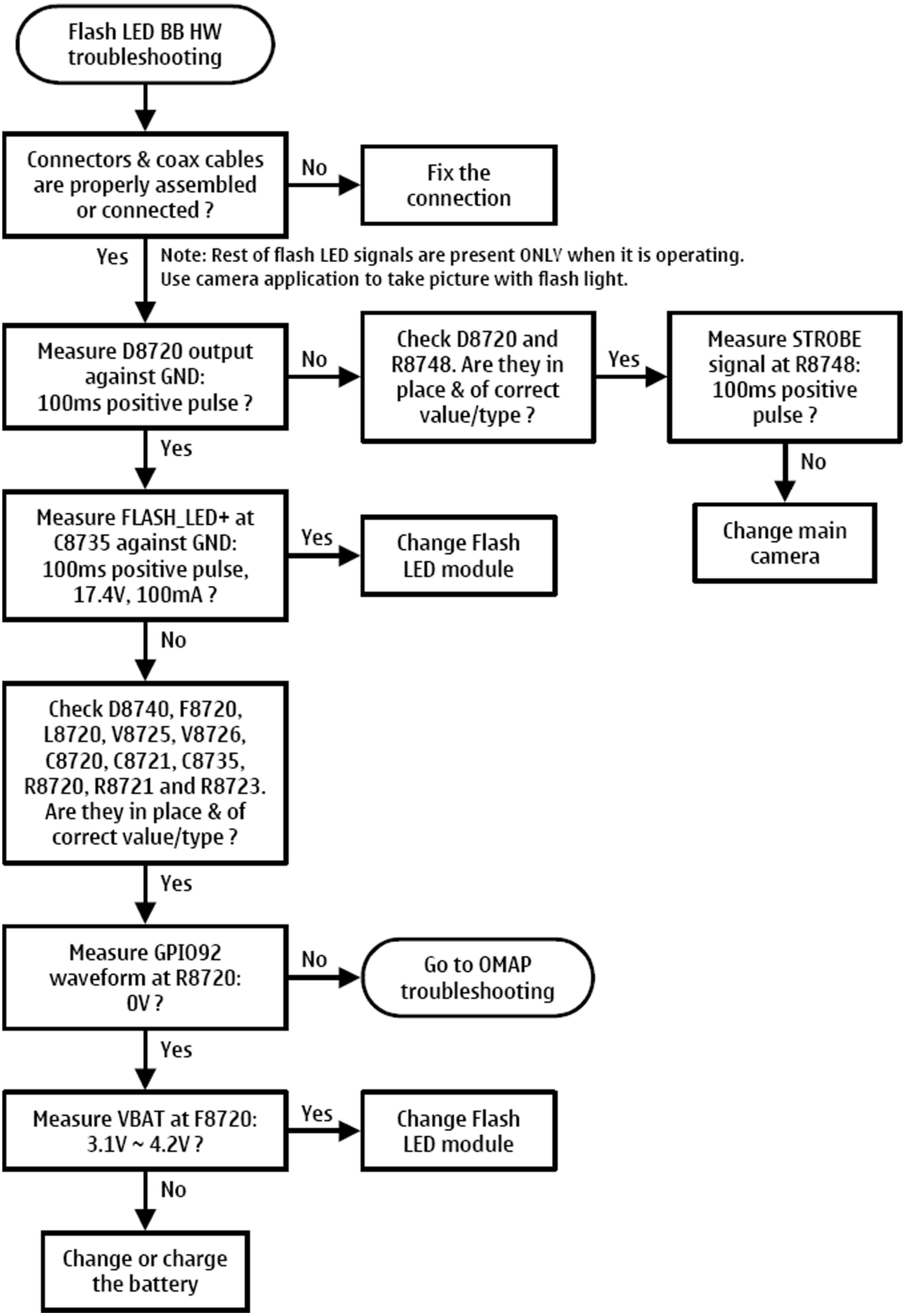
Flash LED functionality troubleshooting

Troubleshooting flow


START
Flash LED is working in torch mode ?
No
Change flash LED module and check the connectors. Is it OK now ?
No
Go to Flash LED BB HW troubleshooting
Yes
Flash LED is working in flash mode ?
No
Change flash LED module and check the connectors. Is it OK now ?
No
Change main camera. Is it OK now ?
No
Yes
Flash power is weak ?
Yes
Change flash LED module and check the connectors. Is it OK now ?
No
No
Yes
Incorrect colors ?
Yes
Test normal camera operation (without flash). Is image OK ?
No
Go to Main camera bad image quality troubleshooting
No
Any other issue ?
Yes
Change main camera. Is it OK now ?
No
Change flash LED module and check the connectors. Is it OK now ?
No
Go to Flash LED BB HW troubleshooting

Flash LED baseband HW troubleshooting

Troubleshooting flow

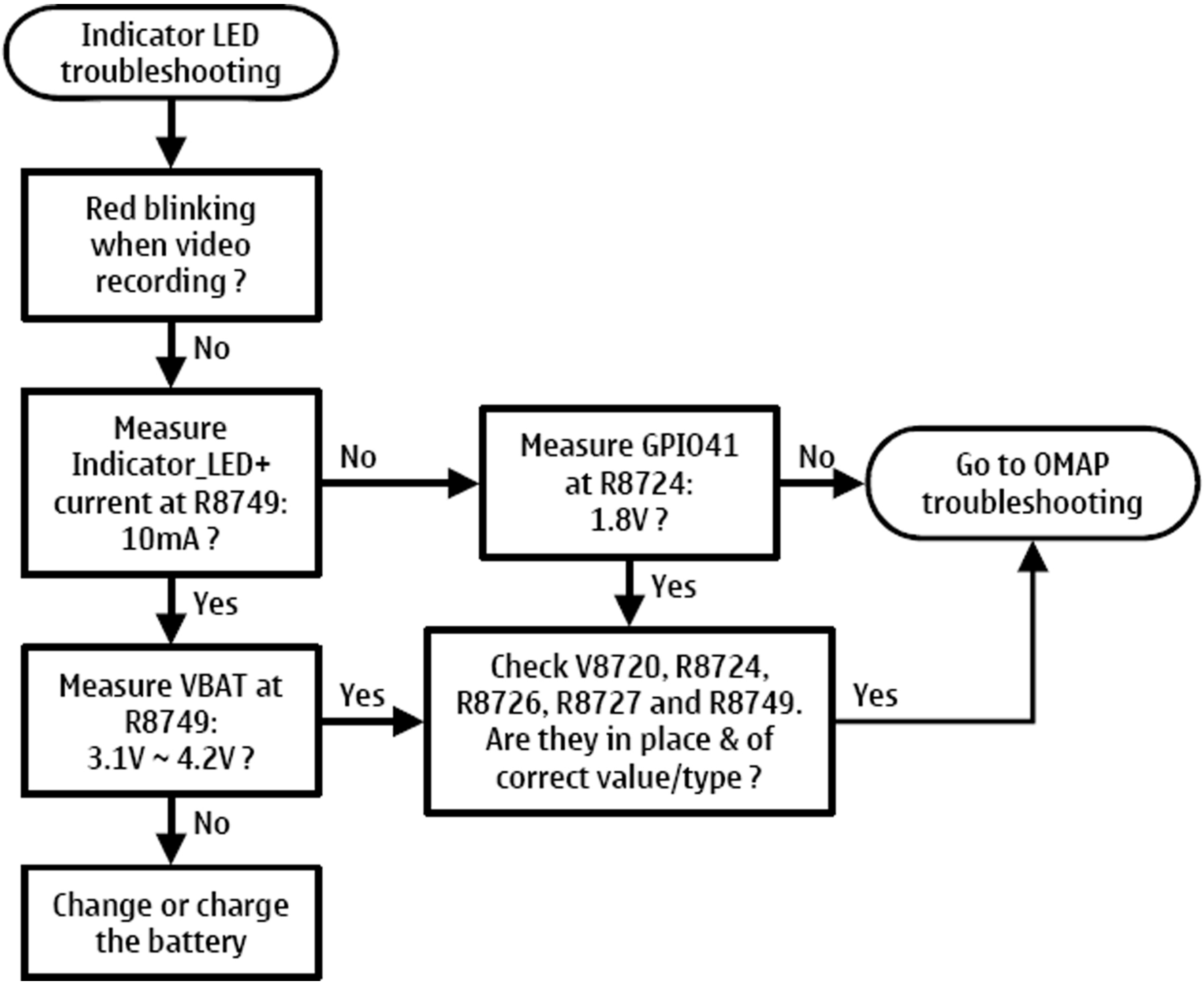

Flash LED BB HW troubleshooting
Connectors & coax cables are properly assembled or connected ?
No
Fix the connection
Yes
Note: Rest of flash LED signals are present ONLY when it is operating. Use camera application to take picture with flash light.
Measure D8720 output against GND: 100ms positive pulse ?
No
Check D8720 and R8748. Are they in place & of correct value/type ?
Yes
Measure STROBE signal at R8748: 100ms positive pulse ?
No
Change main camera
Yes
Measure FLASH_LED+ at C8735 against GND: 100ms positive pulse, 17.4V, 100mA ?
Yes
Change Flash LED module
No
Check D8740, F8720, L8720, V8725, V8726, C8720, C8721, C8735, R8720, R8721 and R8723. Are they in place & of correct value/type ?
Yes
Measure GPIO92 waveform at R8720: 0V ?
No
Go to OMAP troubleshooting
Yes
Measure VBAT at F8720: 3.1V ~ 4.2V ?
Yes
Change Flash LED module
No
Change or charge the battery

Indicator LED troubleshooting

Context

For checking the indicator LED functionality, force the camera application to record a video clip and monitor the indicator LED at the same time. The indicator LED notifies video recording operation by red blinking light.

Troubleshooting flow


Indicator LED troubleshooting
Red blinking when video recording ?
No
Measure Indicator_LED+ current at R8749: 10mA ?
No
Measure GPIO41 at R8724: 1.8V ?
No
Go to OMAP troubleshooting
Yes
Yes
Measure VBAT at R8749: 3.1V ~ 4.2V ?
Yes
Check V8720, R8724, R8726, R8727 and R8749. Are they in place & of correct value/type ?
Yes
No
Change or charge the battery

9 — System Module

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Baseband description

System module block diagram

The device consists of two different main modules: transceiver and UI. The transceiver board consists of baseband and RF components. The UI board consists of key domes and keypad backlights. Connection between the UI and the transceiver board is established via a board-to-board spring connector.

Note: In this description, the user interface HW covers display, camera, keyboard, keyboard backlight and ALS.

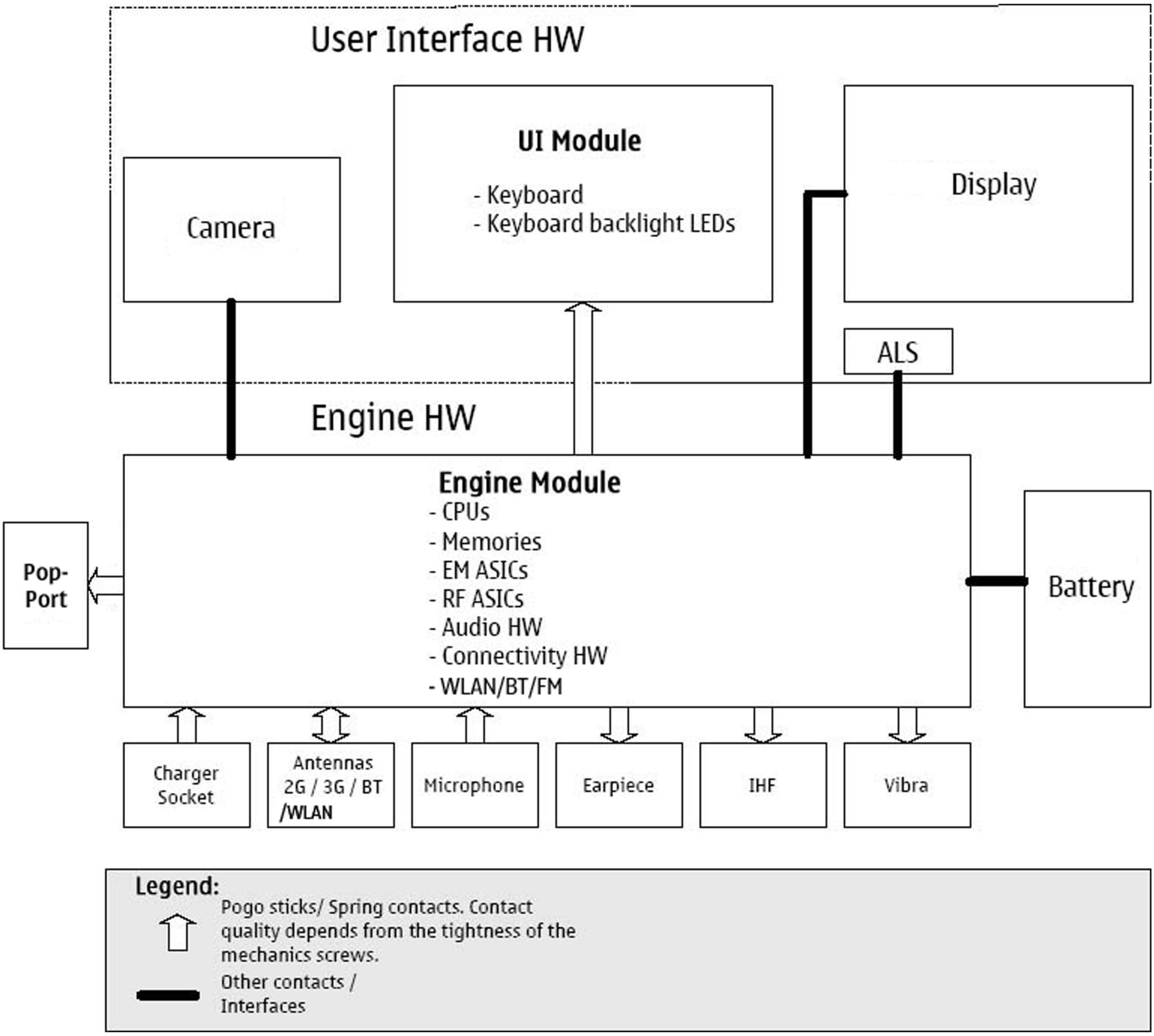
User Interface HW
UI Module
- Keyboard
- Keyboard backlight LEDs
Camera
Display
ALS
Engine HW
Engine Module
- CPUs
- Memories
- EM ASICs
- RF ASICs
- Audio HW
- Connectivity HW
- WLAN/BT/FM
Pop-Port
Battery
Charger Socket
Antennas 2G / 3G / BT /WLAN
Microphone
Earpiece
IHF
Vibra
Legend:
Pogo sticks/ Spring contacts. Contact quality depends from the tightness of the mechanics screws.
Other contacts / Interfaces

Figure 82 System level block diagram

Baseband functional description

Digital baseband consists of an ISA (Intelligent Software Architecture) based modem and Symbian based application sections. The modem functionality is in RAP, and the application processor acts as a platform for Symbian applications. The terms ISA and Symbian are used refer to the software environment of these devices.

The modem section consists of a RAP ASIC with NOR FLASH and SDRAM memory as the core. RAP supports WCDMA and GSM cellular protocols. The modem DDR SDRAM memory has 128 Mbits of memory and NOR flash has 128 Mbits of memory. RAP operates with the system clock of 38.4 MHz, which comes from the VCTCXO.

The application section includes an application processor ASIC with DDR/NAND combo memory as the core.

Application processor

The application processor is also called an application ASIC because it is processing application SW and handles the UI SW. It consists of the application processor and peripheral subsystems such as camera, display and keyboard driver blocks.

In addition to interfaces mentioned above, the peripherals block includes several different I/O interfaces, for example, for keyboard, modem chip, audio, Bluetooth and so on.

Absolute maximum ratings

Signal	Min	Nom	Max	Unit	Notes
Battery voltage (idle)	-0.3		+4.5	V	Battery voltage maximum value is specified during charging is active
Battery voltage (Call)	+3.2		+4.3	V	Battery voltage maximum value is specified during charging is active
Charger input voltage	-0.3		+20	V	
Back-Up supply voltage	0	2.5	2.6	V	Maximum capacity of the backup power supply assumed to be 10 µAh.

Phone modes of operation

Mode	Description
NO_SUPPLY	(dead) mode means that the main battery is not present or its voltage is too low (below EM ASIC N2200 master reset threshold) and that the back-up battery voltage is too low.
BACK_UP	The main battery is not present or its voltage is too low but back-up battery voltage is adequate and the 32kHz oscillator is running (RTC is on).
PWR_OFF	In this mode (warm), the main battery is present and its voltage is over EM ASIC N2200 master reset threshold. All regulators are disabled, PurX is on low state, the RTC is on and the oscillator is on. PWR_OFF (cold) mode is almost the same as PWR_OFF (warm), but the RTC and the oscillator are off.
RESET	RESET mode is a synonym for start-up sequence. In this mode certain regulators are enabled and after they and RFClk have stabilized, the system reset (PurX) is released and PWR_ON mode entered. RESET mode uses 32kHz clock to count the REST mode delay (typically 16ms).
SLEEP	SLEEP mode is entered only from PWR_ON mode with the aid of SW when the system's activity is low.
FLASHING	FLASHING mode is for SW downloading.

Voltage limits

Parameter	Description	Value
VMSTR	Master reset threshold (N2200)	2.2V (typ.)
VMSTR+	Threshold for charging, rising (N2300)	2.1V (typ.)
VMSTR-	Threshold for charging, falling (N2300)	1.9V (typ.)
VCOFF+	Hardware cutoff (rising)	2.9V (typ.)
VCOFF-	Hardware cutoff (falling)	2.6V (typ.)
SWCOFF	SW cutoff limit	~3.2V

The master reset threshold controls the internal reset of EM ASICs. If battery voltage is above VMSTR, N2300 charging control logic is alive. Also, RTC is active and supplied from the main battery. Above VMSTR, N2300 allows the system to be powered on although this may not succeed due to voltage drops during start up. SW can also consider battery voltage too low for operation and power down the system.

Power key

The system boots up when power key is pressed (adequate battery voltage, VBAT, present).

Power down can be initiated by pressing the power key again (the system is powered down with the aid of SW). Power on key is connected to the EM ASIC N2200 via PWRONX signal.

Power distribution

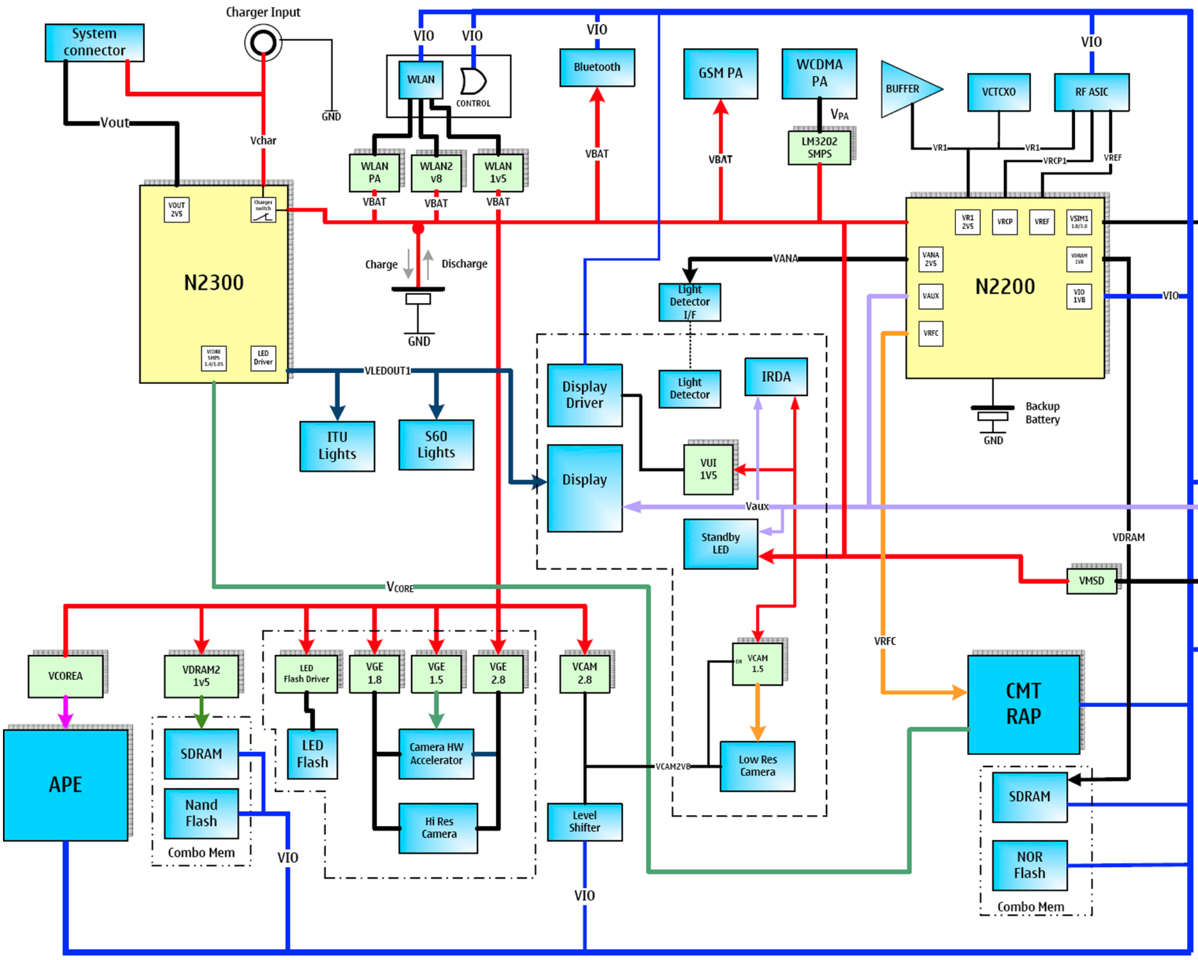
System connector
Charger Input
Vout
Vchar
GND
VIO
WLAN
CONTROL
WLAN PA
WLAN2 v8
WLAN 1v5
VBAT
Bluetooth
GSM PA
WCDMA PA
VPA
LM3202 SMPS
BUFFER
VCTCXO
RF ASIC
VR1
VRCP1
VREF
N2300
VOUT 2V5
Charger switch
VCORE SMPS 1.4/1.05
LED Driver
Charge
Discharge
VANA
Light Detector I/F
Light Detector
IRDA
Display Driver
Display
VUI 1V5
Vaux
Standby LED
VLEDOUT1
ITU Lights
S60 Lights
N2200
VR1 2V5
VRCP
VREF
VSIM1 1.8/3.0
VANA 2V5
VAUX
VRFC
VDRAM 1V8
VIO 1V8
Backup Battery
VSIM1
SIM
Macro Detect
Slide Detect
FM Radio
VDRAM
VMSD
Mini-SD
Level Shifter
VCORE
VCOREA
APE
VDRAM2 1v5
SDRAM
Nand Flash
Combo Mem
LED Flash Driver
LED Flash
VGE 1.8
VGE 1.5
VGE 2.8
Camera HW Accelerator
Hi Res Camera
VCAM 2.8
VCAM2V8
Level Shifter
VCAM 1.5
Low Res Camera
VRFC
CMT RAP
SDRAM
NOR Flash
Combo Mem

Figure 83 Power distribution diagram

Power supply components:

- EM ASIC N2200
- EM ASIC N2300
- EM ASIC N4200
- Application processor VCORE_APE, VIO_APE N4200
- WLAN module supplies: N5501, N5502 and N5503
- Camera supplies: N8901, N8902 and N8903
- Mini SD regulator: N4200 VMMC_APE
- Flash LED driver: D8940

All the above are powered by the main battery voltage.

Battery voltage is also used on the RF side for power amplifiers (GSM PA & WCDMA PA) and for RF ASICs.

Discrete power supplies are used to generate 2.8 V to BT, 3.0 V for the camera voltage, 1.05/1.4 V for the application processor and 18 V for the backlight LEDs. The device supports both 1.8 V/3 V SIM cards which are powered by VSIM1.

USB accessories which need power from the device are powered by N2300 / VOUT.

The external LED driver (N2310) is used in this engine implementation.

System power-up

After inserting the main battery, regulators started by HW are enabled. SW checks, if there is some reason to keep the power on. If not, the system is set to power off state by watchdog. Power up can be caused by the following reasons:

- Power key is pressed
- Charger is connected
- RTC alarm occurs
- MBUS wake-up

After that:

- N2200 activates sleep clock and VANA, VDRAM, VIO and VR1 regulators.
- Voltage appearing at N2200 RSTX pin is used for enabling N2300 ASIC.
- N2300 enables VCORE regulator and its internal RC-oscillator (600 kHz).
- VCTCXO regulator is set ON and RF clock (main system clock) is started to produce.
- N2200 will release PURX ~ 16ms after power up is enabled (the RF clock is then stable enough).
- Synchronizing clock (2.4MHz) for N2300 is started to be produced. After PURX is released and two rising edges of 2.4 MHz synchronous clock have been detected in SMPSClk input N2300 is starting to use that instead of 600kHz internal RC-oscillator.
- HW start-up procedure has been finalized and the system is up and running. Now it is possible for SW to switch ON other needed regulators.

Clocking scheme

There are two main clocks in the system: 38.4 MHz RF clock produced by VCTCXO in RF section and 32.768 kHz sleep clock produced by the EM ASIC N2200 with an external crystal.

RF clock is generated only when VCTCXO is powered on by the EM ASIC regulator. Regulator itself is activated by SleepX signals from both RAP and application processor. When both CPUs are on sleep, RF clock is stopped.

RF clock is used by RAP, which provides (divided) 19.2 MHz SysClk further to the application processor. Both RAP and the application processor have internal PLLs which then create clock signals for other peripheral devices/interfaces like RS MMC, SIM, CCP, I2C and memories.

32k Sleep Clock is always powered on after startup. Sleep clock is used by RAP and the application processor for low-power operation.

SMPS Clk is 2.4 MHz clock line from RAP to EM ASIC N2300 used for switch mode regulator synchronizing in active mode. In deep sleep mode, when VCTCXO is off, this signal is set to '0'-state.

BT Clk is 38.4 MHz signal from the RF ASIC to the Bluetooth system.

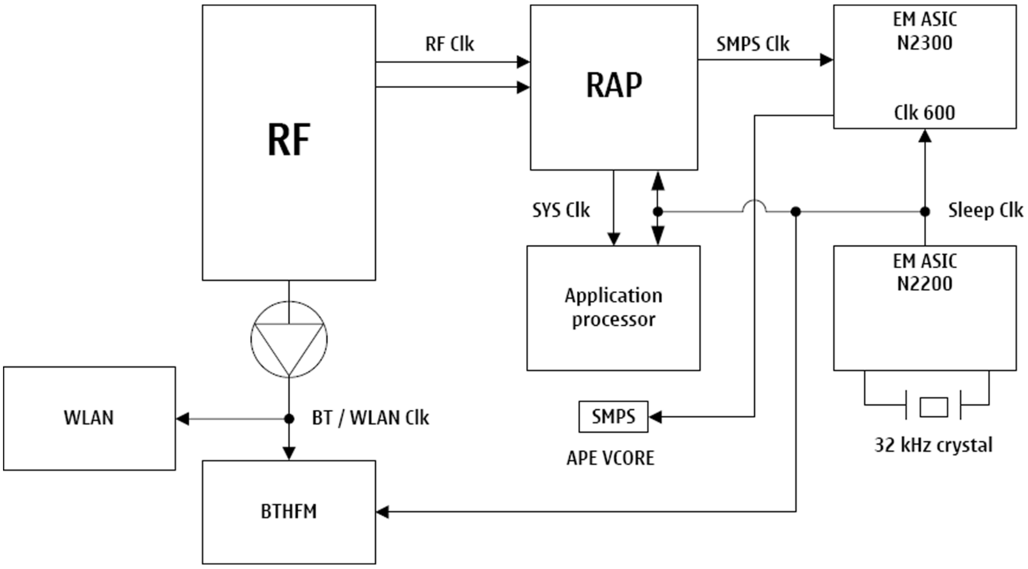

Figure 84 Clocking scheme

Bluetooth/FM module

The device has a module version of Bluetooth, in which BT and FM radio solutions are combined to a single BTHFM module. The module includes all external components except the antenna. However, the two solutions are electrically isolated from one another.

Bluetooth

Bluetooth is an open specification for wireless communication of data and voice. It is based on a low-cost short-range radio link between two or more devices. The traditional example is a link between a mobile phone and a laptop computer or a headset.

Bluetooth provides a fully digital link for communication between a master unit and one or more slave units. The system provides a radio link that offers a high degree of flexibility to support various applications and product scenarios. Data and control interface for a low power RF module is provided. The data rate is regulated between the master and the slave.

The device Bluetooth is based on the BC4 BT ASIC (BTHFM1.0).

The UART1 interface handles the transfer of control and data information between the application processor and the Bluetooth system. The PCM interface is used for audio data transfer between the RAP ASIC and the Bluetooth system.

FM radio

The second part of the BTHFM module contains the FM radio.

The antenna for the FM radio is provided by plugging in an external wired headset to the system connector. It is not possible to listen to the FM radio without a wired headset connected. The FM radio is controlled by I2C commands coming from RAP. The audio output of the FM radio is fed to the headset via the EM ASIC N2200, so the rest of the phone can sleep while the FM radio is active.

USB

USB (Universal Serial Bus) provides a wired connectivity between a USB host PC and peripheral devices.

USB is a differential serial bus for USB devices. USB controller supports USB specification revision 2.0 with full speed USB (12 Mbps). The device is connected to the USB host through the system connector. The USB bus is hot plugged capable, which means that USB devices may be plugged in/out at any time.

WLAN interface

A Wireless Local Area Network (WLAN) is a flexible data communication system in which a mobile user can connect to a local area network through a wireless connection. The standard, which specifies the technologies for WLAN, is called IEEE 802.11. The device supports both IEEE 802.11.b and 802.11.g standards, so the support data rates are from 1 Mbps to 54 Mbps in 2.4 GHz ISM band.

The WLAN module also requires the reference clock of 38.4 MHz.

The WLAN module uses the same VIO as the application processor.

The same antenna is shared with BT and WLAN. When BT_CLK_REQ is activated and WLANENABLE is disabled, the antenna can be used by BT.

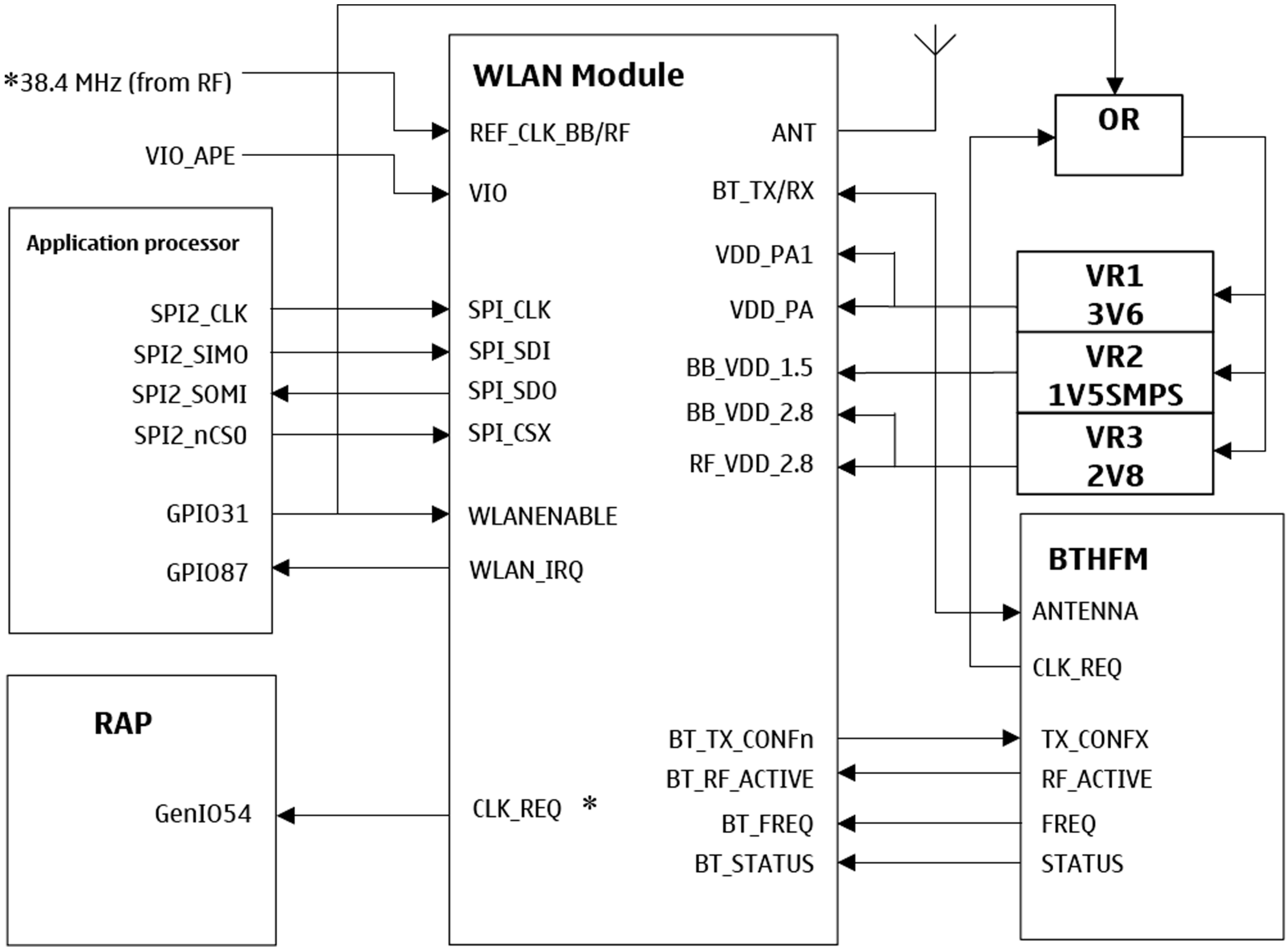
*38.4 MHz (from RF)
VIO_APE
WLAN Module
REF_CLK_BB/RF
ANT
VIO
BT_TX/RX
VDD_PA1
VDD_PA
BB_VDD_1.5
BB_VDD_2.8
RF_VDD_2.8
SPI_CLK
SPI_SDI
SPI_SDO
SPI_CSX
WLANENABLE
WLAN_IRQ
BT_TX_CONFn
BT_RF_ACTIVE
CLK_REQ *
BT_FREQ
BT_STATUS
Application processor
SPI2_CLK
SPI2_SIMO
SPI2_SOMI
SPI2_nCS0
GPIO31
GPIO87
RAP
GenIO54
OR
VR1
3V6
VR2
1V5SMPS
VR3
2V8
BTHFM
ANTENNA
CLK_REQ
TX_CONFX
RF_ACTIVE
FREQ
STATUS

Figure 85 WLAN block diagram

Irda interface

IrDA specifies a low-cost, reliable, fully digital peer-to-peer data link between IrDA units at data rates to 115.2k bits/s. The link is based on the serial transmission of data as pulses of infrared light at the wave length of 870 nm and angles of +-15 degrees at the range 0 - 50 to 100 cm. Because these restrictions and the optical nature of the link, the transmission is not omnidirectional but focused, and only reaches a peer at a limited line-of-sight distance from the transmitter. Therefore, the transmission does not disturb any other units in the neighbourhood.

The IR interface is implemented into the application processor. The processor block uses the UART3 circuit to communicate with a standard IrDA transceiver. The IR transceiver module complies with the IrDA specification version 1.4. The data rates are in the range of 9600 bit/s to 115200 bits/s.

The IR interface in the application processor and the IR transceiver module use the I/O voltage 1.8 V on the Rx (processor receive), Tx (processor send), and SD (IR module shutdown) pins. The IR transmission is powered from the phone battery VBAT (nominal 3.7 V) through a load resistor.

IR communication is half-duplex, meaning that the IR receiver sees its own transmission, and the IR interface is either transmitting or receiving, but not both at the same time. IrDa modules consume current when the IR detector is active.

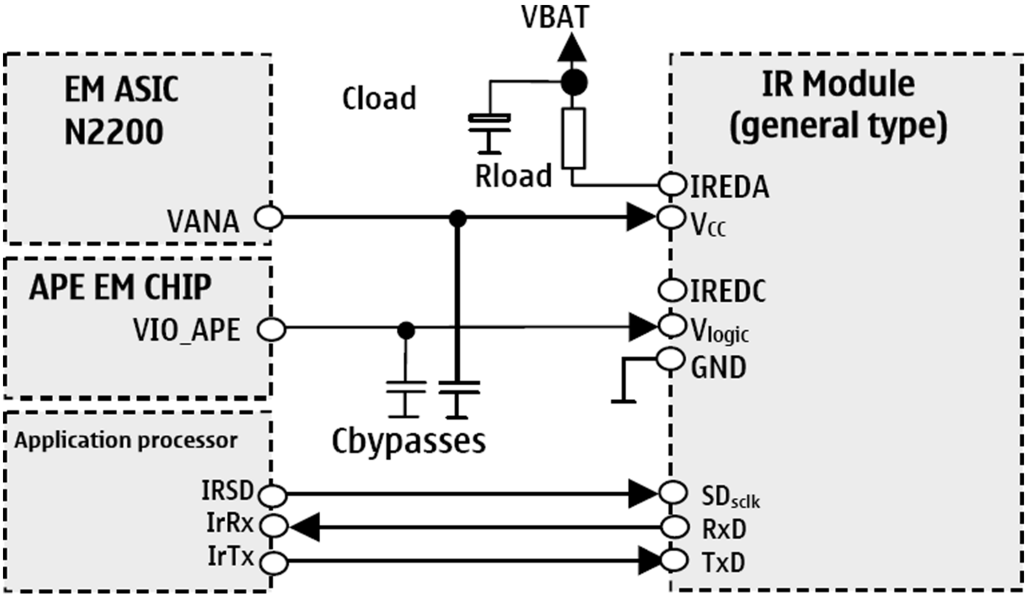
VBAT
EM ASIC
N2200
VANA
Cload
Rload
IR Module
(general type)
IREDA
Vcc
APE EM CHIP
VIO_APE
IREDC
Vlogic
GND
Cbypasses
Application processor
IRSD
IrRx
IrTx
SDsclk
RxD
TxD

Figure 86 Interconnections between application processor, EM ASICs, and IR module

SIM interface

The device has one SIM (Subscriber Identification Module) interface. It is accessible, although the battery is in place. The SIM interface consists of an internal interface between RAP and EM ASIC (N2200), and of an external interface between N2200 and SIM contacts.

The SIM IF is shown in the following figure:

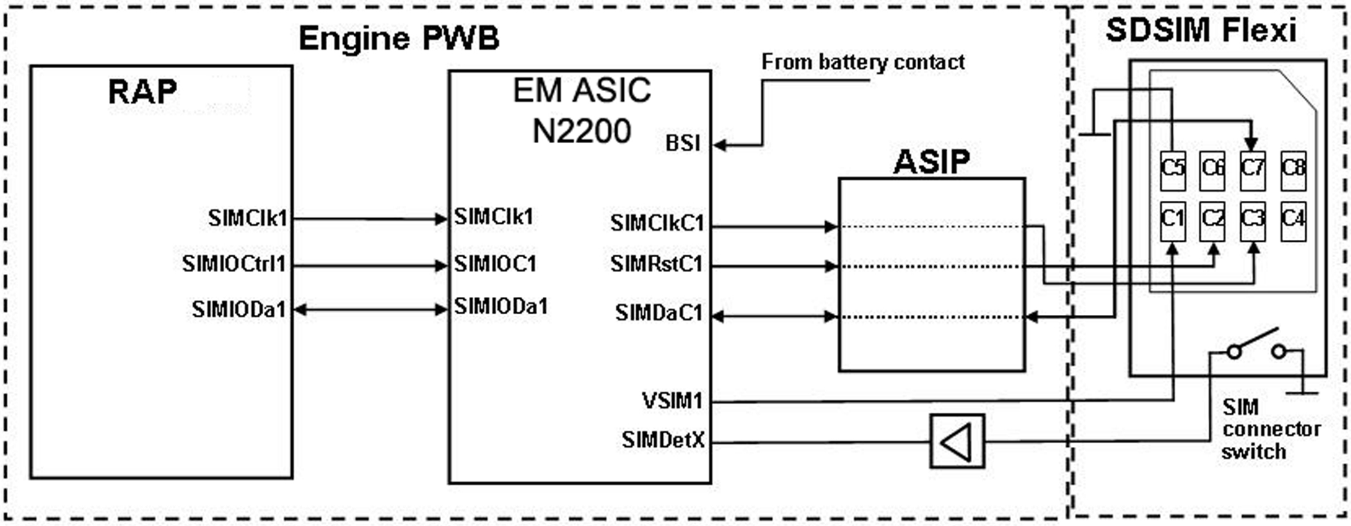
Engine PWB
SDSIM Flexi
RAP
EM ASIC
N2200
From battery contact
BSI
ASIP
SIMClk1
SIMIOCtrl1
SIMIODa1
SIMClk1
SIMIOC1
SIMIODa1
SIMClkC1
SIMRstC1
SIMDaC1
VSIM1
SIMDetX
C5
C6
C7
C8
C1
C2
C3
C4
SIM
connector
switch

Figure 87 SIM interface

Because of the location of the SIM card, removing the battery causes a quick power down of the SIM IF.

The EM ASIC SIM1 interface supports both 1.8 V and 3.0 V SIM cards. The SIM interface voltage is first 1.8 V when the SIM card is inserted, and if the card does not response to the ATR a 3 V interface voltage is used.

MiniSD interface

The Secure Digital (SD) card is supplied with 3 V supply voltage. The detection of SD card removal/insertion is done by a switch in the card connector. Removing the SD card while writing to it may corrupt all data in the card.

TV-out interface

A TV-out connection is implemented using the application processor Video DAC (Digital-to-Analogue Converter) interface and an external analogue line driver. The device engine supports the following systems using composite video (CVBS):

- M/NTSC
- J/NTSC
- 4.43/NTSC
- M/PAL
- N/PAL
- Nc/PAL
- B/PAL
- G/PAL
- D/PAL
- H/PAL
- I/PAL

CVBS is a single video signal containing all the necessary information to reproduce a colour picture. The video signal is feed to an external connector.

Battery interface

The phone is powered by a 3-pole BP-6M battery. The three poles are named VBAT, BSI and GND where the BSI line is used to recognize the battery capacity. This is done by means of an internal battery pull down resistor.

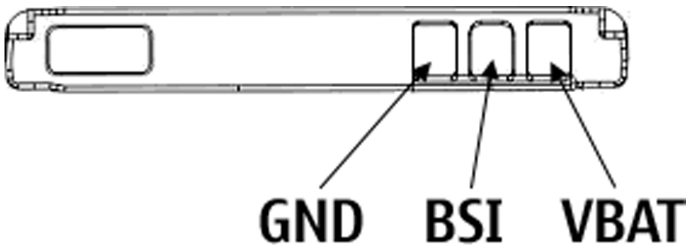

Figure 88 Battery pin order

Table 24 Battery interface connections

Pin	Signal	I/O	Engine connection		Notes
1	VBAT	->	EM ASIC N2200	VBAT	Battery voltage

Pin	Signal	I/O	Engine connection		Notes
2	BSI	->	EM ASIC N2200	BSI	Battery size indication (fixed resistor inside the battery pack)
3	GND		GND		Ground

Table 25 Battery IF electrical characteristics

Description	Parameter	Max	Unit
Operation voltage	V_{IN}	4.23	VDC
Current rating	I_{IN}	0.9	A

Battery temperature is estimated by measuring separate battery temperature NTC via the BTEMP line, which is located on the main PWB, at a place where the phone temperature is most stabile.

The connection from the charger connector to the charger is established via a charger adaptor.

For service purposes, the device software can be forced into local mode by using pull down resistors connected to the BSI line.

User interface

Main display

Display module mechanical concept

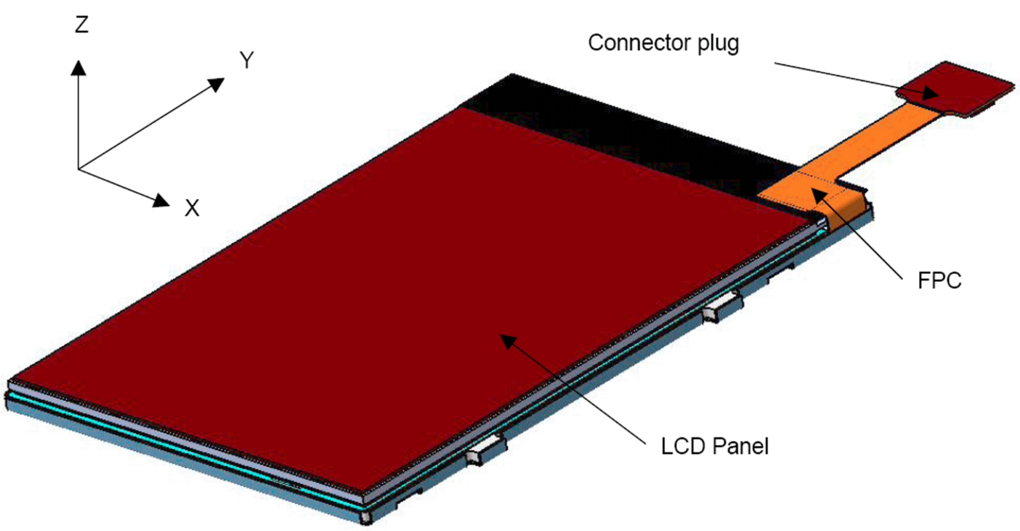

Figure 89 General diagram of the LCD module

Display features:

- Module size (width x height x thickness) 41.92 mm, 60.55 mm, 2.72 mm
- Resolution QVGA
- Numbers of colours up to 262k

- Partial display function; power saving by pausing display process on part of the screen.
- Built-in RAM capacity 240 columns x 320 rows x 18 bits = 1,382,400 bits

The display has two different operating modes:

- Normal mode, Full screen, 262k colors
- Partial idle mode, 8 colours but only part of the display is active

The interconnection between the LCD module and the Nokia engine is implemented with a 24-pin board-to-board connector.

The display is controlled via a MeSSi-16 interface with an 8-bit bus by the application processor. All MeSSi-16 signals go through the EMC filtering ASIPs. The display module does not require any tunings in service.

Keyboard

The device keyboard is connected to the main PWB with a board-to-board connector.

The keymatrix has six rows and four columns. The voice key on the main PWB and the navigation key are connected to the same keymatrix.

Key	Row	Column	Switch Ref.
0	1	3	S17
1	0	0	S9
2	0	1	S14
3	0	3	S21
4	1	0	S10
5	1	1	S15
6	1	2	S22
7	2	0	S11
8	2	1	S16
9	2	2	S23
*	0	3	S12
#	2	3	S24
END	3	1	S19
SEND	3	0	S7
EDIT	4	2	S8
CLEAR	3	2	S20
APPS	4	1	S25
Operator	4	0	S13
Soft 1 (Left)	4	3	S6
Soft 2 (Right)	3	3	S18
Soft 3 (Left on Flip)	3	4	S1 (Flip)
Soft 4 (Right on Flip)	4	4	S2 (Flip)
NAVI Left	F	A	S2

Key	Row	Column	Switch Ref.
NAVI Right	E	A	S4
NAVI Up	C	A	S1
NAVI Udown	D	A	S3
NAVI Select	G	A	S5
NAVI Left (Phone Side)	F	B	S26
NAVI Right (Phone Side)	E	B	
NAVI Up (Phone Side)	C	B	
NAVI Udown (Phone Side)	D	B	
NAVI Select (Phone Side)	G	B	

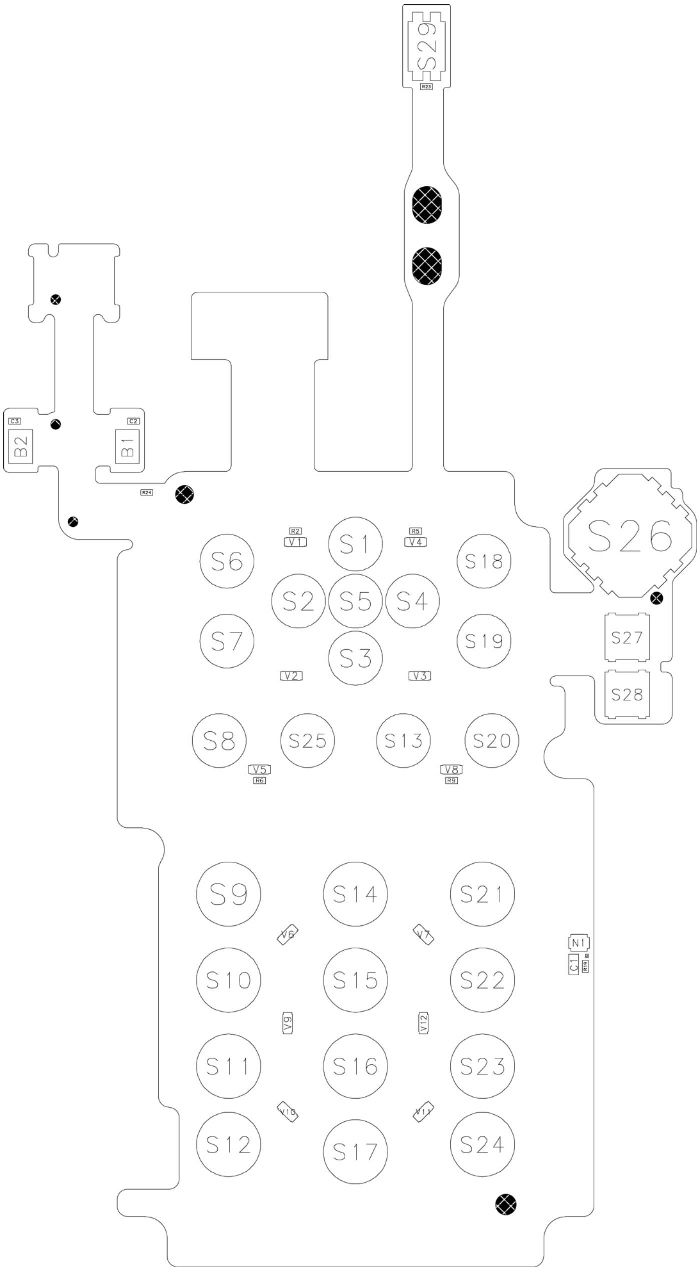
S29
B2
B1
S26
S1
S6
S18
S2
S5
S4
S7
S3
S19
S27
S28
S8
S25
S13
S20
V1
V4
V2
V3
V5
V8
S9
S14
S21
S10
S15
S22
S11
S16
S23
S12
S17
S24
N1
C1

Figure 90 Keyboard layout

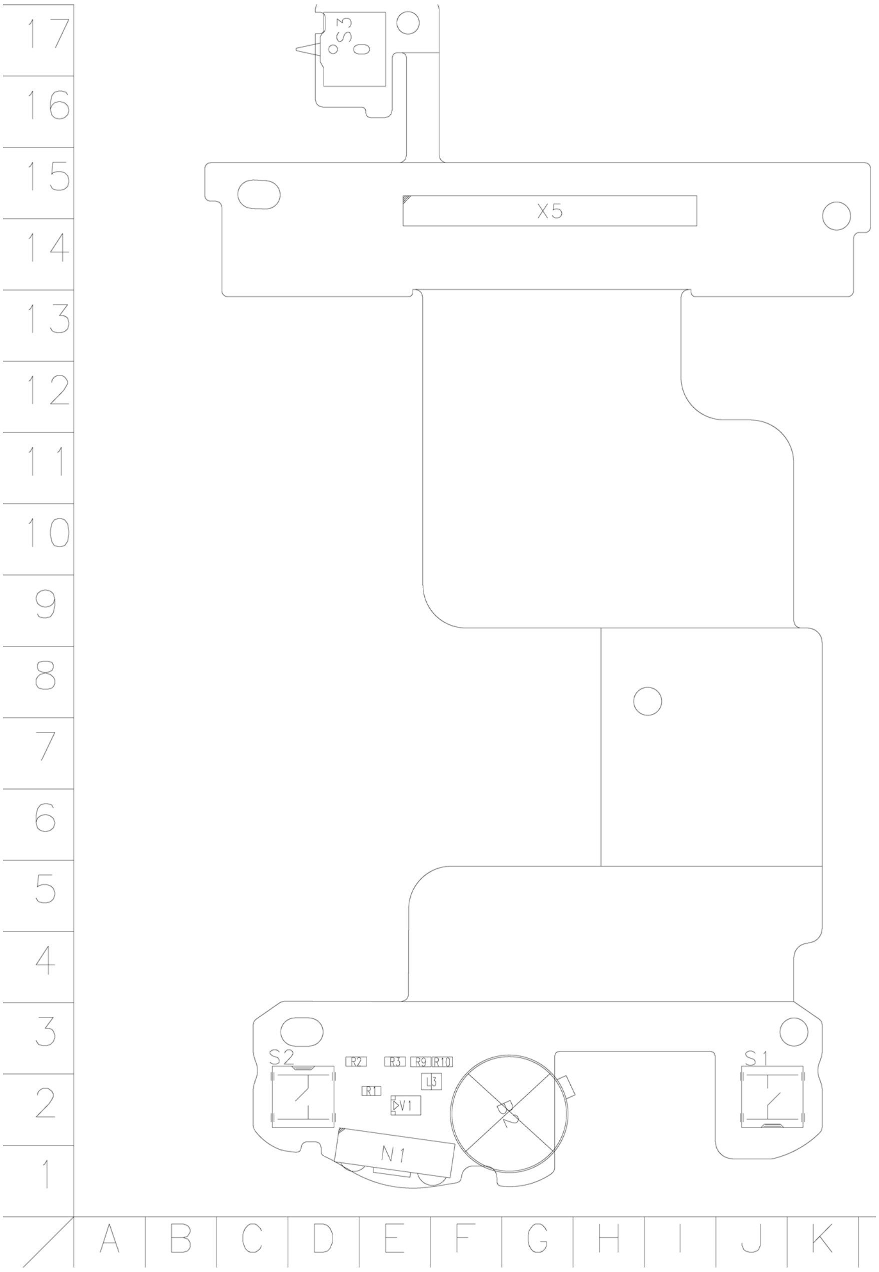
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
A
B
C
D
E
F
G
H
I
J
K
S3
X5
S2
R2
R3
R9
R10
R1
L3
V1
N1
B2
S1

Figure 91 Flip layout

Display and keyboard backlight

The device has one LED driver that provides current for main/sub display and keyboard LEDs.

The LED driver circuit consists of five LED chains: one for the main display LED, one for the sub display chain, and three for keyboard chains. The main display contains four white LEDs and the sub display one. Keyboard has four LEDs in each LED chain, twelve LEDs in total. The keyboard current follows the display brightness. Typically, keyboard LEDs are turned ON only in dark ambient lighting conditions.

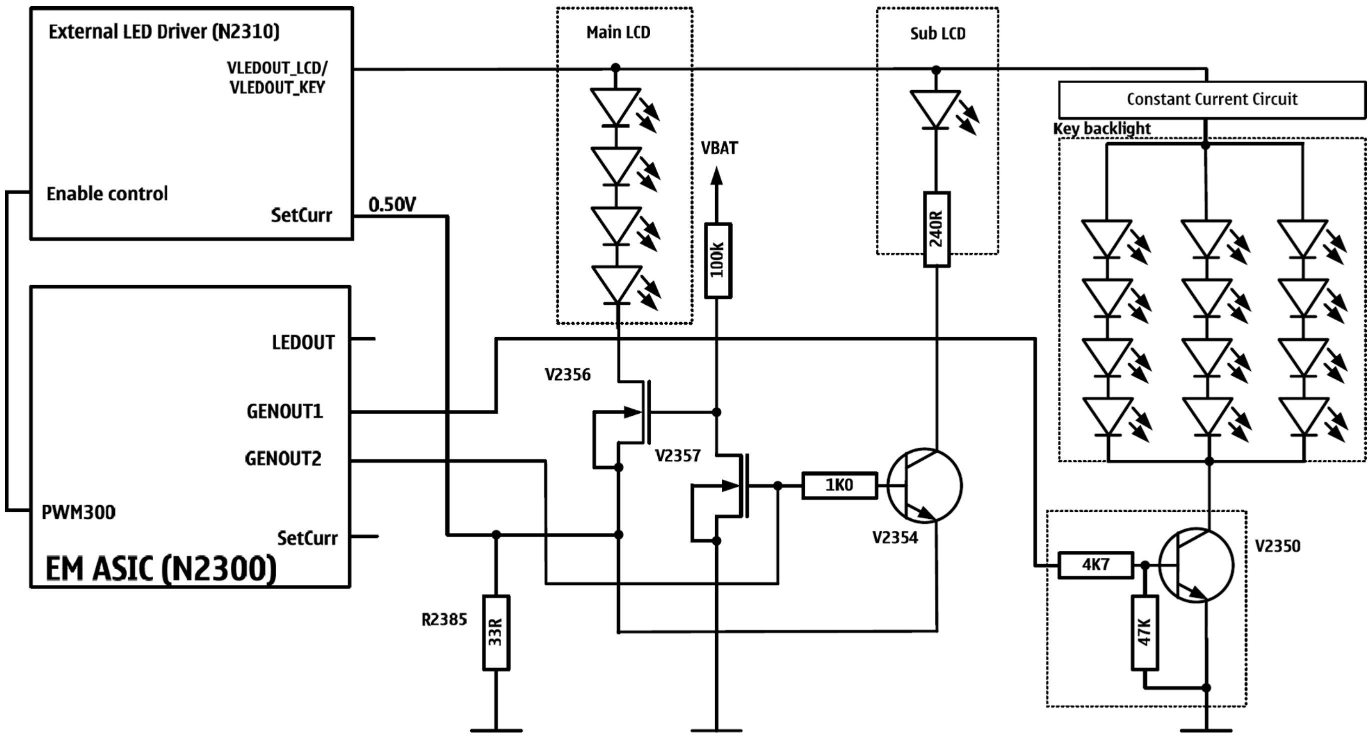
External LED Driver (N2310)
VLEDOUT_LCD/
VLEDOUT_KEY
Enable control
SetCurr
0.50V
Main LCD
Sub LCD
VBAT
100k
240R
Constant Current Circuit
Key backlight
LEDOUT
GENOUT1
GENOUT2
PWM300
SetCurr
EM ASIC (N2300)
V2356
V2357
1K0
V2354
V2350
4K7
47K
R2385
33R

Figure 92 Display and backlight circuit

The keyboard backlight on/off is controlled by GENOUT1. The display backlight target is controlled by GENOUT2 with FET/transistor (V2354 and V2356 and V2357).

Table 26 Backlight target selection

Main display backlight	Sub display backlight	Key backlight	GENOUT1	GENOUT2
OFF	ON	OFF	0V	1.8 V
OFF	ON	OFF	0V	1.8 V
ON	OFF	OFF	0V	0 V
ON	OFF	ON	1.8V	0 V
OFF	OFF	OFF	0V	0 V

ALS interface

Ambient Light Sensor (ALS) is located in the upper part of the phone. It consists of the following components:

- lightguide (part of the front cover)
- phototransistor (V4400) + resistor (R4401)
- NTC + resistors (R4400, R4402, R4403)
- EM ASIC (N2200)

Information on ambient lighting is used to control the backlights of the phone:

- Keypad lighting is switched on only when the environment is dark / dim
- Display backlights are dimmed, when the environment is dark / dim

The ambient light sensor itself is a photo transistor, which is temperature-compensated by an external NTC resistor. N2200 reads the light sensor (LS) and temperature (LST) results.

ALS calibration is not possible in the service points. ALS is serviced by replacing faulty phototransistors.

ASICs

RAP ASIC

RAP ASIC is a 3G Radio Application Processor. RAM memory is integrated into RAP.

EM ASIC N2300

The EM ASIC (N2300) includes the following functional blocks:

- Core supply generation
- Charge control circuitry
- Level shifter and regulator for USB/FBUS
- Current gauge for battery current measuring
- LED driver for backlights
- Digital interface (CBUS)

EM ASIC N2200

The EM ASIC (N2200) includes the following functional blocks:

- Start up logic and reset control
- Charger detection
- Battery voltage monitoring
- 32.768kHz clock with external crystal
- Real time clock with external backup battery
- SIM card interface
- Stereo audio codecs and amplifiers
- A/D converter
- Regulators
- Vibra interface
- Digital interface (CBUS)

Device memories

RAP memories NOR flash and SDRAM

Modem memory consists of 128 Mbit SDRAM and 128 Mbit NOR flash memories.

Combo memory

The application memory of the device consists of NAND/DDR combo memory. The stacked DDR/NAND application memory has 512 Mbit of DDR memory and 1024 Mbit of flash memory.

Audio concept

Audio HW architecture

The functional core of the audio hardware is built around two ASICs: RAP CMT engine ASIC and mixed-signal ASIC (N2200).

The mixed-signal ASIC (N2200) provides an interface for the transducers and the accessory connector. Because audio amplifiers are also integrated into the ASIC, the only discrete electronics components needed for audio paths are audio filtering components and EMC/ESD components.

There are three audio transducers:

- 8 mm dynamic earpiece
- 16 mm dynamic speaker
- two digital MEMS (Microelectromechanical Systems) microphones

In addition to the audio transducers, N2200 also provides an output for the dynamic vibra component.

All galvanic audio accessories are connected to the system connector.

A Bluetooth audio and FM radio module, which is connected to the RAP ASIC supports Bluetooth audio and FM radio functionality.

There is also a separate application ASIC for Symbian applications.

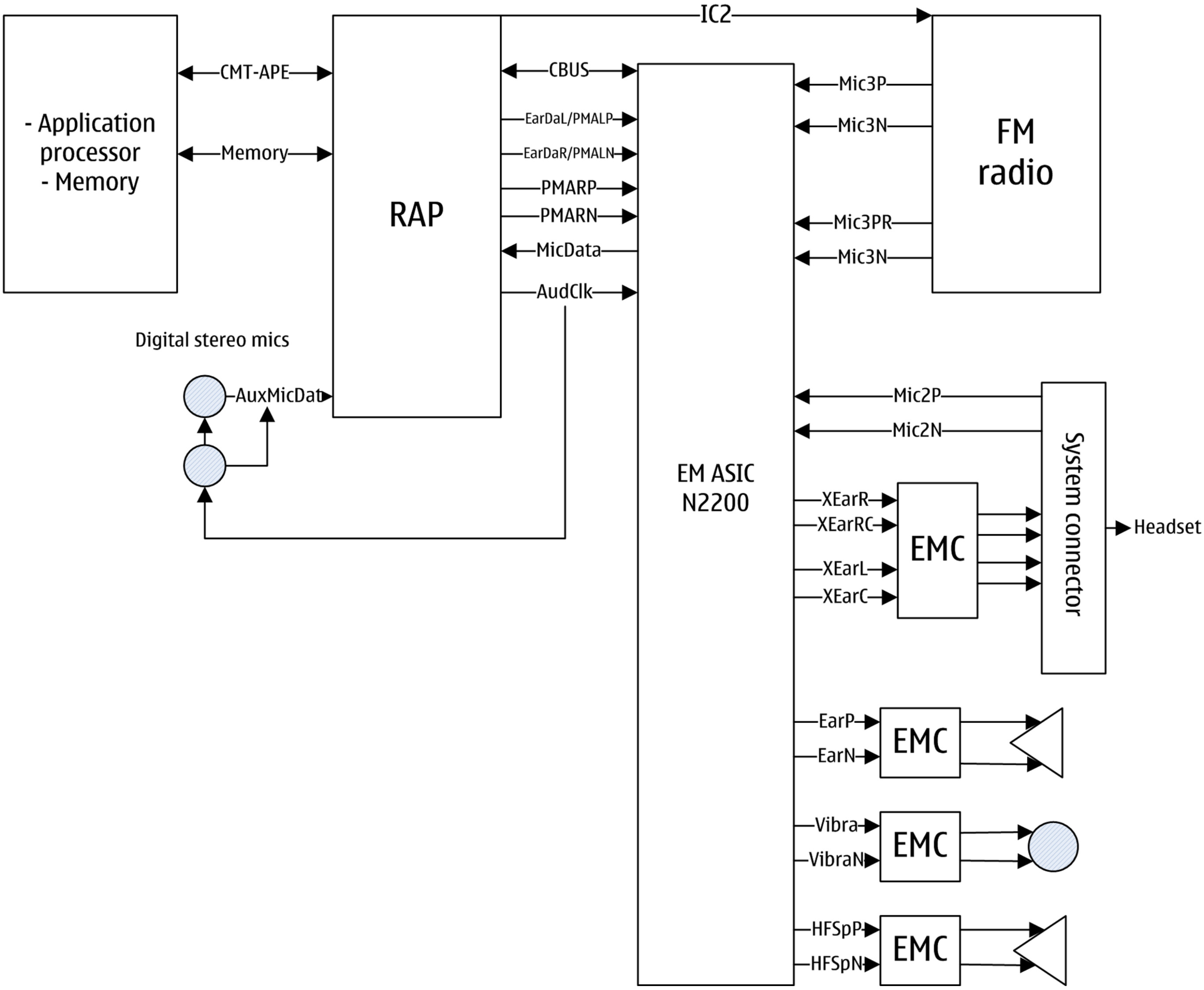
- Application processor
- Memory
CMT-APE
Memory
RAP
IC2
CBUS
EarDaL/PMALP
EarDaR/PMALN
PMARP
PMARN
MicData
AudClk
FM radio
Mic3P
Mic3N
Mic3PR
Mic3N
Digital stereo mics
AuxMicDat
EM ASIC N2200
Mic2P
Mic2N
System connector
Headset
XEarR
XEarRC
XEarL
XEarC
EMC
EarP
EarN
EMC
Vibra
VibraN
EMC
HFSpP
HFSpN
EMC

Figure 93 Audio block diagram

Internal microphone

The internal microphone is used for HandPortable (HP) and Internal HandsFree (IHF) call modes, and camcorder stereo recording.

Two digital MEMS microphones are connected to the RAP ASIC (D2800) via an analogue switch IC (N2150). The microphone power and clock signals are controlled by this switch.

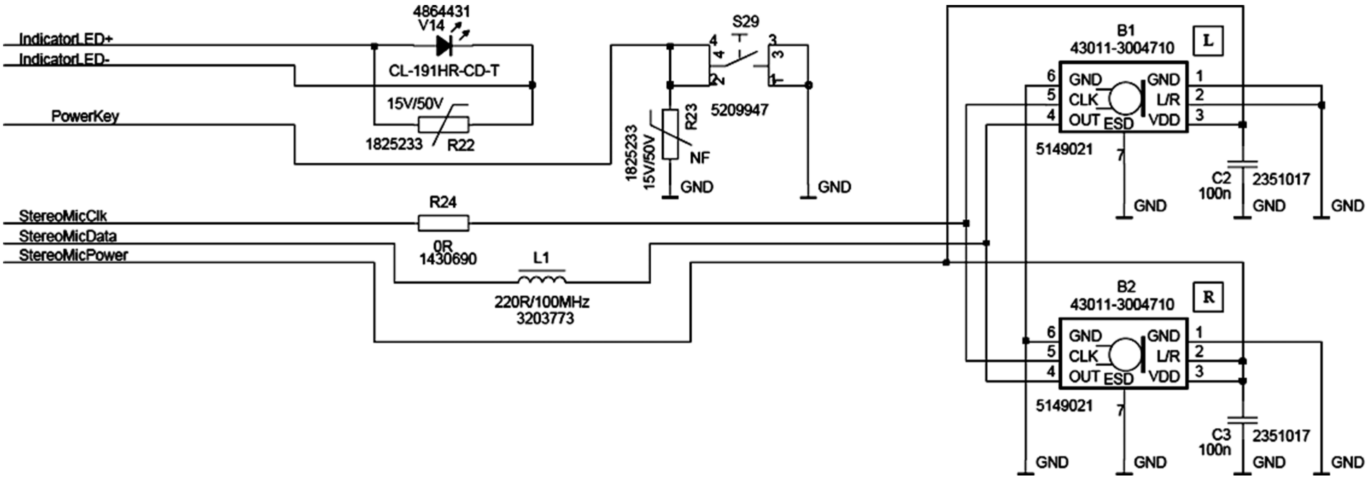
IndicatorLED+
IndicatorLED-
PowerKey
StereoMicClk
StereoMicData
StereoMicPower
4864431
V14
CL-191HR-CD-T
15V/50V
1825233
R22
S29
5209947
R23
1825233
15V/50V
NF
GND
GND
R24
0R
1430690
L1
220R/100MHz
3203773
B1
43011-3004710
L
GND
CLK
OUT
ESD
GND
L/R
VDD
5149021
C2
100n
2351017
GND
GND
GND
B2
43011-3004710
R
GND
CLK
OUT
ESD
GND
L/R
VDD
5149021
C3
100n
2351017
GND
GND
GND
GND

Figure 94 Internal microphone circuitry in UI flex PWB

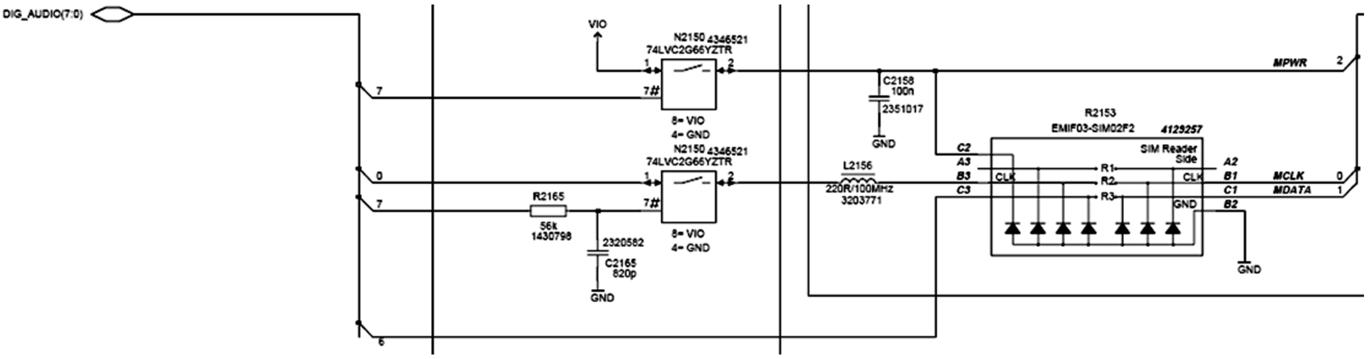
DIG_AUDIO(7:0)
VIO
N2150 4346521
74LVC2G66YZTR
8= VIO
4= GND
N2150 4346521
74LVC2G66YZTR
8= VIO
4= GND
R2165
56k
1430798
2320582
C2165
820p
GND
C2158
100n
2351017
GND
L2156
220R/100MHz
3203771
R2153
EMIF03-SIM02F2
4129257
SIM Reader Side
C2
A3
B3
C3
CLK
R1
R2
R3
CLK
GND
A2
B1
C1
B2
MPWR
MCLK
MDATA
GND

Figure 95 Internal microphone circuitry in engine PWB

External microphone

Galvanic accessories are connected to the system connector.

Accessory audio mode is automatically enabled/disabled during connection/disconnection of dedicated phone accessories.

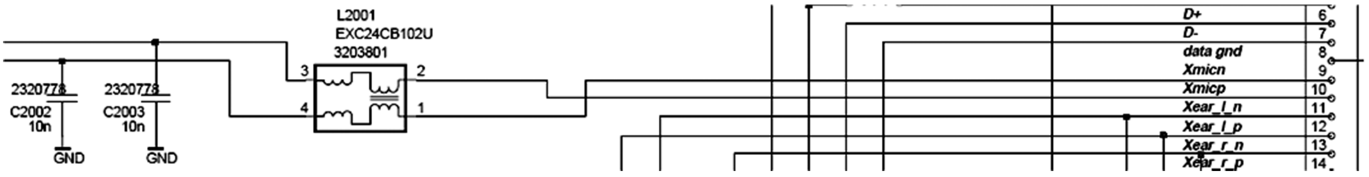
L2001
EXC24CB102U
3203801
2320778
C2002
10n
GND
2320778
C2003
10n
GND
D+
D-
data gnd
Xmicn
Xmicp
Xear_l_n
Xear_l_p
Xear_r_n
Xear_r_p
6
7
8
9
10
11
12
13
14

Figure 96 External microphone circuitry

Internal earpiece

The internal earpiece is used in the HandPortable (HP) call mode. A dynamic 8 mm earpiece capsule is connected directly to the EM ASIC (N2200) differential outputs EarP and EarN through the flip flexi PWB and micro coaxial cable (X6 - X8900).

Internal speaker

The internal speaker is used in Internal HandsFree (IHF) call mode.

A dynamic 16 mm speaker is connected to the EM ASIC (N2200) outputs HFSpP and HFSpN through the flip flexi PWB and micro coaxial cable (X6 - X8900).

The IHF amplifier integrated in N2200 is a Digital Pulse Modulated Amplifier (DPMA).

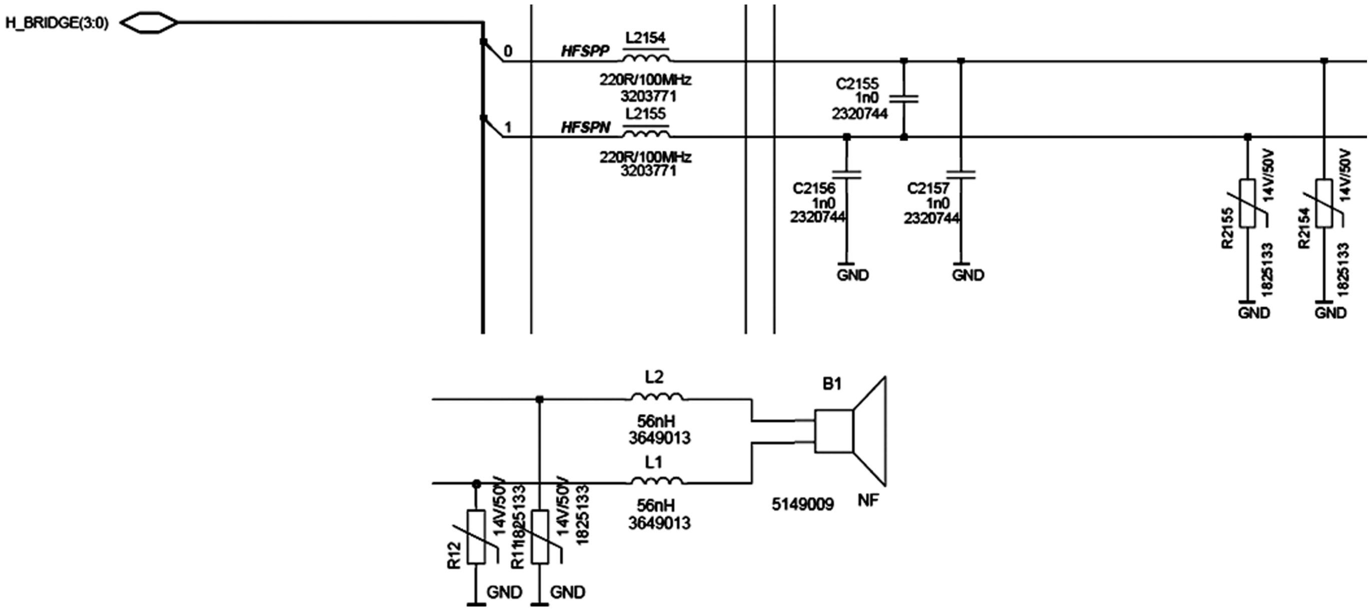
H_BRIDGE(3:0)
0
1
HFSPP
HFSPN
L2154
220R/100MHz
3203771
L2155
220R/100MHz
3203771
C2155
1n0
2320744
C2156
1n0
2320744
C2157
1n0
2320744
GND
GND
R2155
14V/50V
1825133
GND
R2154
14V/50V
1825133
GND
L2
56nH
3649013
L1
56nH
3649013
B1
5149009
NF
R12
14V/50V
1825133
R11
14V/50V
1825133
GND
GND

Figure 97 Internal speaker circuitry

External earpiece

All galvanic accessories are connected to the system connector.

The accessory audio mode is automatically enabled/disabled during connection/disconnection of dedicated phone accessories.

The EM ASIC (N2200) provides two output channels in either single-ended or differential format. N2200 outputs XearL and XearLC form the left channel audio output, and XearR and XearRC the right channel audio output. XearLC and XearRC are the ground pins if the output works in a single-ended operation. The XearLC signal is multiplexed with a video output signal coming from the application processor ASIC side.

In the system connector side, HSEAR P and HSEAR N form the left channel output, and HSEAR R P and HSEAR R N the right channel output. Respectively, HSEAR N and HSEAR R N are the ground pins if the output works in a single-ended operation.

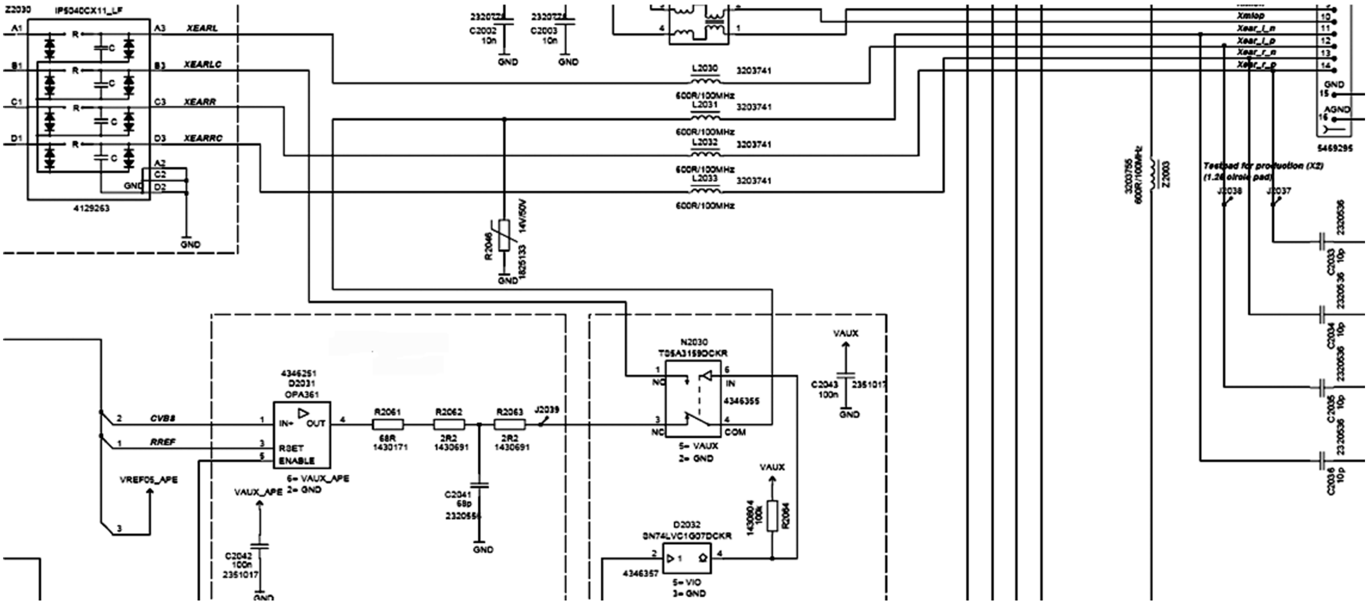
Z2030
IP5040CX11_LF
XEARL
XEARLC
XEARR
XEARRC
4129263
GND
L2030
3203741
600R/100MHz
L2031
L2032
L2033
R2046
14V/50V
1825133
CVBS
RREF
VREF05_APE
D2031
OPA361
R2061
68R
1430171
R2062
2R2
1430691
R2063
2R2
1430691
J2039
C2041
68p
C2042
100n
2351017
VAUX_APE
N2030
TS5A3159DCKR
4346355
VAUX
C2043
100n
2351017
D2032
SN74LVC1G07DCKR
4346357
R2064
Xmiop
Xear_l_n
Xear_l_p
Xear_r_n
Xear_r_p
GND
AGND
5469295
Testpad for production (X2)
(1.20 circle pad)
J2038
J2037
C2033
10p
2320536
C2034
C2035
C2036

Figure 98 External earpiece circuitry (system connector connected on the right)

SMD microphone handling

The membranes of SMD microphones are fragile and break easily. It is strictly forbidden to expose the membrane to a vacuum or to a "compressed air pistol" during cleaning of the board at any phase without protecting the microphone from the high pressure air.

> **Note:** It is strictly forbidden to touch the membrane. It is recommended that the microphone is not touched manually at all.

Vibra circuitry

Vibra is used for the vibra alarm function.

The vibra motor is connected to the EM ASIC (N2200) VibraP and VibraN Pulse Width Modulated (PWM) outputs.

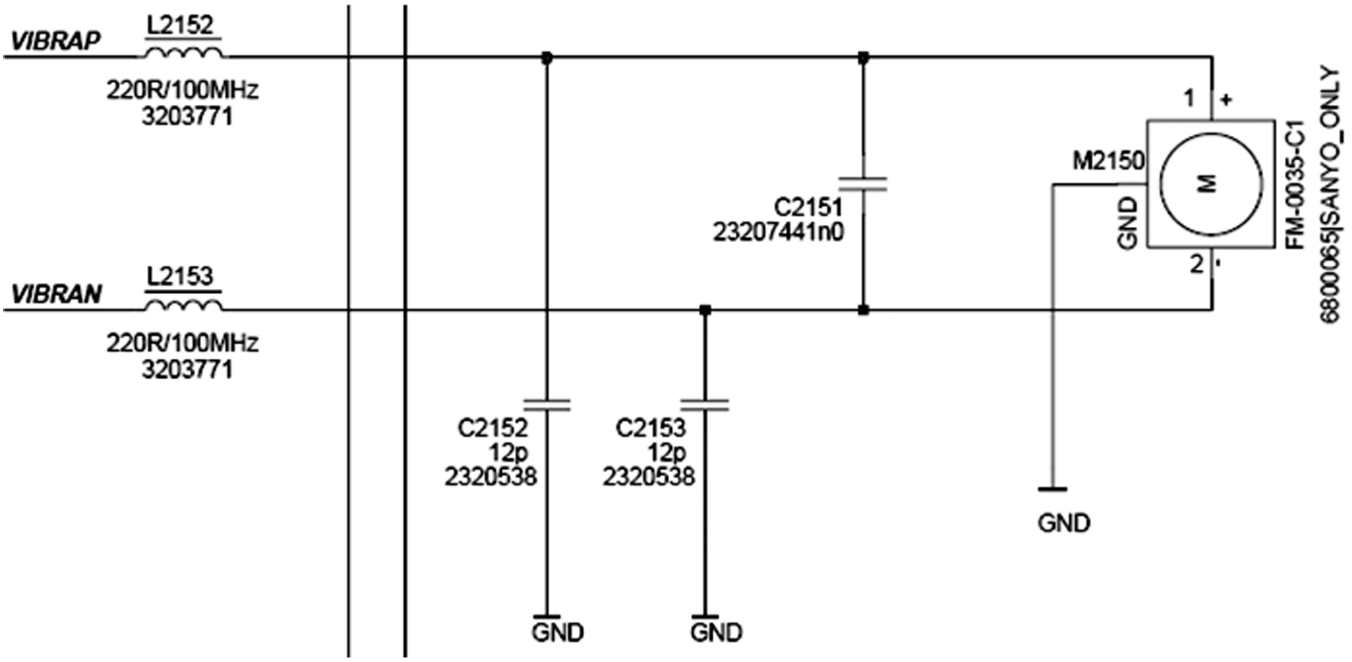
VIBRAP
L2152
220R/100MHz
3203771
VIBRAN
L2153
220R/100MHz
3203771
C2151
23207441n0
C2152
12p
2320538
C2153
12p
2320538
GND
GND
M2150
1
+
2
M
GND
FM-0035-C1
6800065|SANYO_ONLY
GND

Figure 99 Vibra circuitry

The vibra is connected to the engine PWB through springs attached to the vibra motor body – X2100 and X2101 are hard gold plated contact pads on the PWB.

System connector

The system connector provides a fully differential 4–wire stereo line-level output connection and a fully differential 2-wire mono line-level or microphone level input connection.

The handsfree driver in N2200 is meant for the headset.

The output is driven in a fully differential mode. In the fully differential mode, the handsfree pin is the negative output and the HFCM pin is the positive output. The gain of the handsfree driver in the differential mode is 6 dB.

The HEAR N is multiplexed with a video output signal. When the video out cable is connected, the system detects it via ACI, and switches from Xear N signal to video output automatically.

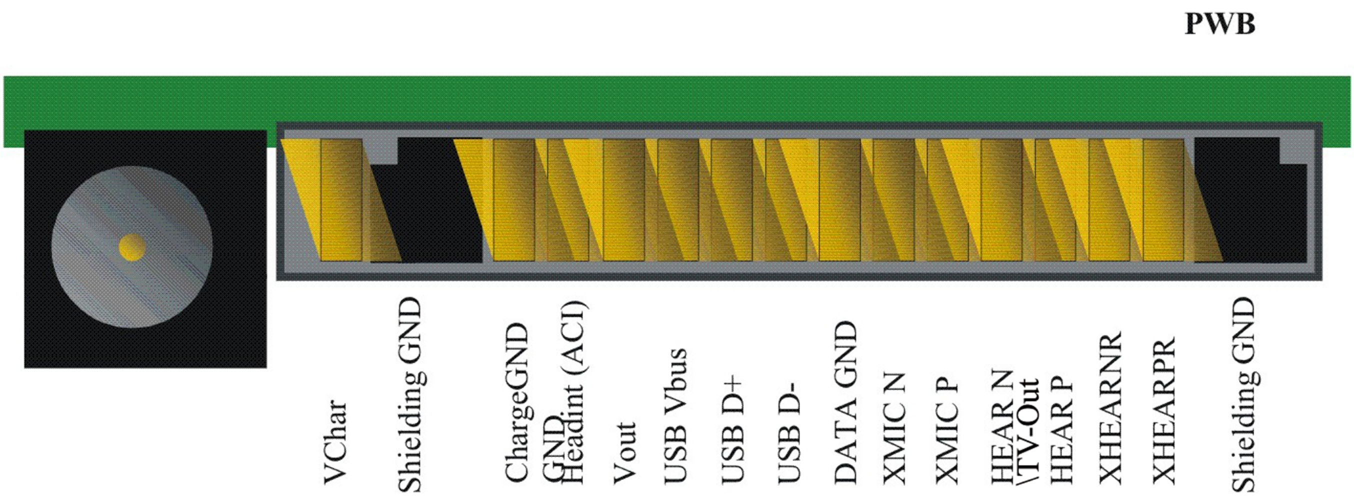

Figure 100 External audio connector

Table 27 Audio connector pin assignments

Pin #/ Signal name	Signal description	Spectral range	Voltage/ Current levels	Max or nominal serial impedance	Notes
1/ Charge	V Charge	DC	0-9V/ 0.85A		
2/ GND	Charge GND	-	0.85A	100mΩ (PWB+ conn.)	
3/ ACI	ACI	1kbits/s	Digital 0 / 2.5-2.78V	47Ω	Insertion & removal detection
4/ Vout	DC out	DC	2.78V 70 mA 2.5V 90mA	100mΩ (PWB+ conn.)	200mW
9 / XMIC N	Audio in	300-8k	1Vpp & 2.5-2.78VDC		
10 / XMIC P	Audio in	300-8k	1Vpp & 2.5-2.78VDC		

Pin #/ Signal name	Signal description	Spectral range	Voltage/ Current levels	Max or nominal serial impedance	Notes
11 / HEAR N or video	Audio out or video out	20-20k or 0-6M	1Vpp	10Ω or 75Ω	Audio, video multiplex
12 / HEAR P	Audio out	20-20k	1Vpp	10Ω	
13 / HEAR R N	Audio out	20-20k	1Vpp	10Ω	Not conn. in mono
14 / HEAR R P	Audio out	20-20k	1Vpp	10Ω	Not conn. in mono

Baseband technical specifications

External interfaces

Name of Connection	Connector reference
USB	X2001 (on engine PWB)
Charger	X2000 (on engine PWB)
Headset	X2001
SIM	X2 (on SDSIM flexi)
Mini SD	X1 (on SDSIM flexi)
Battery connector	X2070 (on engine PWB)
TV-out	X2001 (on engine PWB)

VOUT electrical characteristics

Description	Parameter	Min	Max	Typical	Unit	Notes
Vout regulator for external accessories	VOUT	2.43	2.57	2.5	V	Max load 90mA

SIM IF connections

Pin	Signal	I/O	Engine connection		Notes
C1	VSIM	Out	EM ASIC N2200	VSIM1	Supply voltage to SIM card, 1.8V or 3.0V.
C2	SIMRST	Out	EM ASIC N2200	SIM1Rst	Reset signal to SIM card
C3	SIMCLK	Out	EM ASIC N2200	SIM1ClkC	Clock signal to SIM card

Pin	Signal	I/O	Engine connection		Notes
C5	GND	-	GND		Ground
C7	SIMDATA	In/Out	EM ASIC N2200	SIM1DaC	Data input / output
SW	SIM_DET	In	EM ASIC N2200	SIMDetX	Removal detection

Charger connector and charging interface connections & electrical characteristics

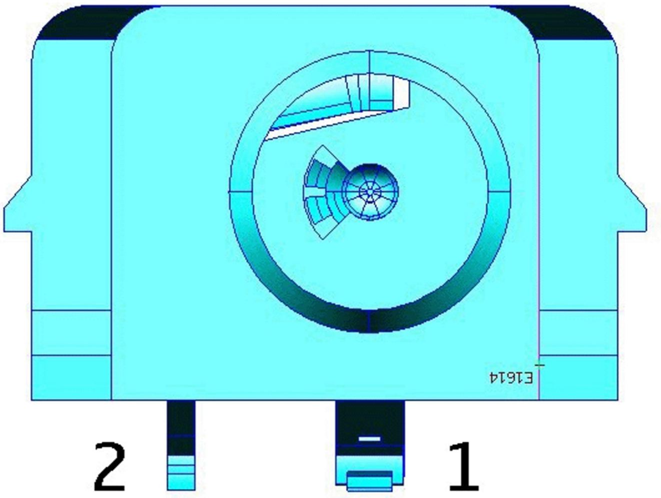

Figure 101 Charger connector

Table 28 Charging interface connections

Pin	Signal	I/O	Engine connection		Notes
1	Vchar	In	N2300	VCharIn1, 2	Charging voltage / charger detection, Center pin
2	Charge GND		Ground		Charger ground

Table 29 Charging IF electrical characteristics

Description	Parameter	Min	Max	Unit	Notes
Vchar	V Charge	0	9	V	Center pin
Vchar	I Charge		0.85	A	Center pin
Charge GND			0.85	A	

Internal interfaces

Name of Connection	Connector reference
UI connector	X4400
Display	X4401
Main camera	X8901
Sub camera	X8901
ALS	V4400
Vibra	M2100
Microphone	B2100
Earpiece	B2101
IHF speaker	B2102

UI connections

Table 30 User interface connections

Pin	Signal	I/O	Engine connection		Notes
1	GND		GND		
2	LED+	<-	N2301	VLEDOUT2	Discrete Backlight SMPS (controlled by EM ASIC N2300)
3	Col2	->	D4800	Kbc_2	
4	LED-	->	R2305 + V2300	SETCURR2	Serial resistor + Transistor switch (controlled by EM ASIC N2300)
5	Col1	->	D4800	Kbc_1	Voice switch connection
6	GND		GND		
7	Row3	->	D4800	Kbr_3	
8	Row2	->	D4800	Kbr_2	
9	Row1	->	D4800	Kbr_1	
10	Row6	->	D4800	Kbr_6	
11	Row0	->	D4800	Kbr_0	
12	Col0	->	D4800	Kbc_0	
13	Row5	->	D4800	Kbr_5	Voice switch connection
14	Row4	->	D4800	Kbr_4	

Pin	Signal	I/O	Engine connection		Notes
15	GND		GND		
16	Col3	->	D4800	Kbc_3	

Back-up battery interface electrical characteristics

Table 31 Back-up battery connections

Pin name	I/O	Connection	Notes
L2207, VBack	->	N2200, VBack	Back-up battery G2200 is connected to N2200 via coil

Table 32 Back-up battery electrical characteristics

Description	Parameter	Min	Typ	Max	Unit
Back-Up Battery Voltage	Vback	0	2.5	2.7	V

RF description

Receiver

Introduction to receiver functionality

Receiver functions are implemented in an RF ASIC.

The receiver is a linear direct conversion receiver consisting of separate front ends (LNA (Low Noise Amplifier) and demodulator) for each supported system. After the demodulators, the signal paths are combined to one common BB path.

WCDMA receiver functionality

In the WCDMA mode, the received signal is fed from the antenna to a duplex filter. After the duplex filter the signal goes via a balun to an LNA (Low Noise Amplifier) residing in N7500. From the LNA, the signal goes trough a band pass filter.

After filtering, the signal goes to the down conversion mixer, which converts the signal to baseband I and Q signals. At the BB frequency the signal is amplified, and fed to a low pass filter. The Rx channel filter must be calibrated with an automatic routine whenever the Rx ASIC IC is changed to a phone.

In the WCDMA mode, the corner frequency of the filter is set to approximately 2.1 MHz. The filter is followed by an AGC (Automatic Gain Control) amplifier with an adjustable gain. The signal is further amplified before it is fed to balanced analogue IQ output pins. The analogue output pins are accompanied by reference voltage output, which sets the DC level for the AD converter in the BB ASIC RAP.

The last stage of the RF Rx chain is an output buffer which feeds the signal and a reference voltage (VREFCM) to the BB ASIC.

GSM receiver functionality

As GSM Rx branches are functionally identical, the following description is applicable to all of them.

The received signal goes from the GSM antenna to the antenna switch module.

The antenna switch module is followed by integrated LNAs residing in the Rx ASIC.

The LNAs are followed by demodulators which downconvert the signal to baseband I and Q signals.

After the down conversion mixer, the Rx chain is similar to the WCDMA Rx. The channel select filter is set to 115 kHz in the GSM mode.

Transmitter

Introduction to transmitter functionality

Transmitter functions are implemented in an RF ASIC. The ASIC contains a BB frequency low pass filter, which is tunable according to the signal bandwidth of the system in use.

In addition, the ASIC contains separate RF paths comprising a final frequency IQ modulator and VGA amplifiers.

WCDMA transmitter functionality

In the transmitter side, an analogue I/Q modulated signal is received from digital baseband into an RF ASIC and fed through a low pass filter. After the filter the signal is fed to the IQ modulator, which converts the signal to final Tx frequency. There are two separate I/Q modulators: one for WCDMA and another for GSM signals. The signal then exits the RF ASIC via a balanced line. Next, the signal is band pass filtered by a SAW filter before it is fed to the WCDMA PA module. After the PA, the transmitted WCDMA signal is fed through an isolator and a duplex filter to the antenna.

WCDMA power control

WCDMA Tx power control is accomplished by the two VGA amplifier stages in the Tx ASIC.

The VGAs have a common temperature compensation circuit and one voltage mode analogue input for gain control (TXC).

Another function of the detector voltage is to steer the DC/DC converter, which is providing a variable supply voltage for the WCDMA PA.

WCDMA PA module

The WCDMA PA is housed in a separate module having:

- a variable supply voltage input for the amplifier stages (Vcc11),
- a battery supply voltage for the bias circuits (Vcc12),
- and two bias current inputs.

Bias currents are generated by 5-bit DA converters in the RF ASIC.

If a different manufacturer's PA is changed to the phone, this setting must be set again.

PA DC/DC converter

The control of the DC/DC converter is fed back from the power detector circuit.

GSM transmitter functionality

An RF ASIC receives an analogue IQ modulated signal from the digital BB. The signal is first low pass filtered, and then routed to the GSM modulator. The amplifier gives 40 dB of power control dynamic range.

After the VGA stage the signal exits the RF ASIC. In case of GSM1800/1900 the signal goes directly to the GSM PA module. In case of EGSM900 (and GSM850, if applicable), the PA module is preceded by a SAW filter. After the filter, the signal is fed to the GSM Tx front-end module (TXFEM), which also contains the antenna switch.

GSM power control

A closed control loop comprise an integrated power detector (in PA module) and an error amplifier. The error amplifier resides in N7501, and it controls the transmitter power of GSM.

Detector output from the PA gives a DC level proportional to the output power. The DC voltage is fed to the negative input of the error amplifier, where it is compared to the level of the reference signal, TXC. TXC is received from the BB circuitry. The output of the error amplifier is fed to a buffer amplifier, which in turn steers the VGA amplifier.

The power control loop is enabled and disabled by writing an appropriate register in N7501 RF ASIC. In case of dual slot transmission, the output power is ramped down between the consecutive slots.

GSM PA module

The TXFEM module contains two separate amplifier chains, one for EGSM900 (and GSM850, if applicable) and another for GSM1800/1900. Both amplifiers have a battery supply connection and two bias current inputs.

Antennas

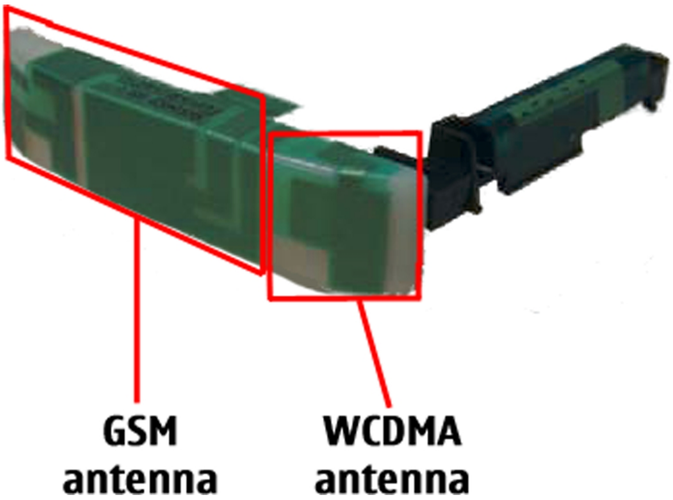

Figure 102 GSM and WCDMA antenna

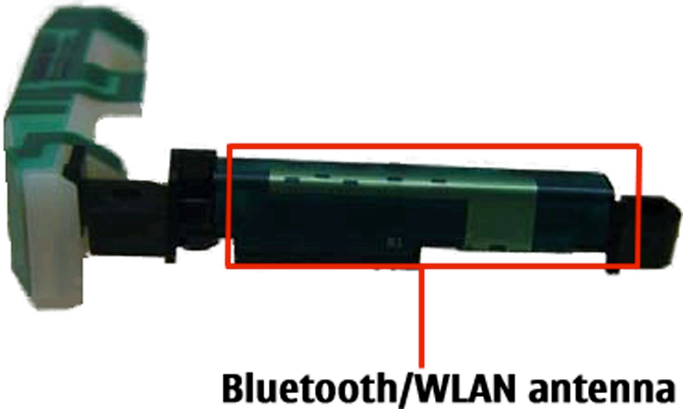

Figure 103 Bluetooth/WLAN antenna

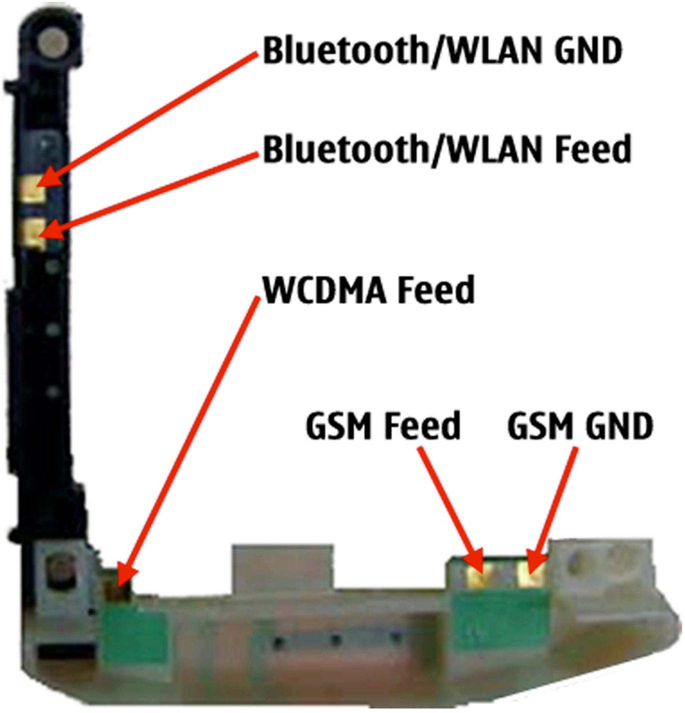
Bluetooth/WLAN GND
Bluetooth/WLAN Feed
WCDMA Feed
GSM Feed
GSM GND

Figure 104 Feed and GND spots of the antennas

The antenna module consists of two separate parts combined (mechanical snap fit) together. One is the GSM-WCDMA antenna block (white) and the other is the Bluetooth/WLAN antenna block (black). Both blocks are made of flex film radiator, and attached with an adhesive on the plastic block.

The GSM-WCDMA antenna block has two separate antenna elements: GSM antenna radiator and WCDMA antenna radiator. The GSM antenna has one Feed and one GND contacts. The WCDMA antenna has only one Feed contact.

The Bluetooth/WLAN antenna is used for both Bluetooth and WLAN protocols, enabled by switching inside the WLAN module. The antenna has one Feed and one GND contact.

The contacts of the GSM antenna are separated in the (RDC = 0 ohm) short-circuit. The contacts of the Bluetooth/WLAN antenna are in the (RDC = 0 ohm) short-circuit.

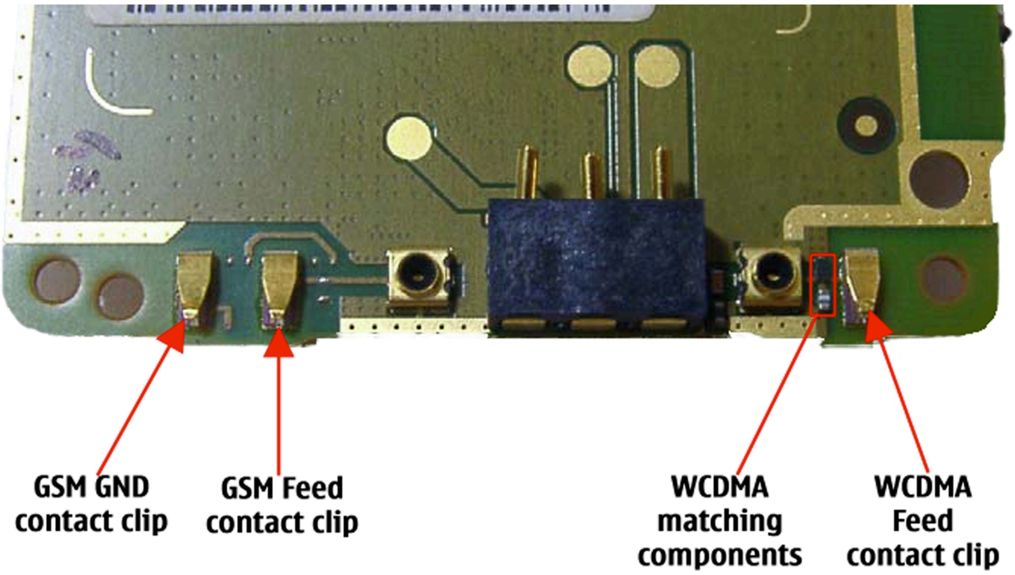
GSM GND contact clip
GSM Feed contact clip
WCDMA matching components
WCDMA Feed contact clip

Figure 105 GSM and WCDMA antenna contacts on PWB

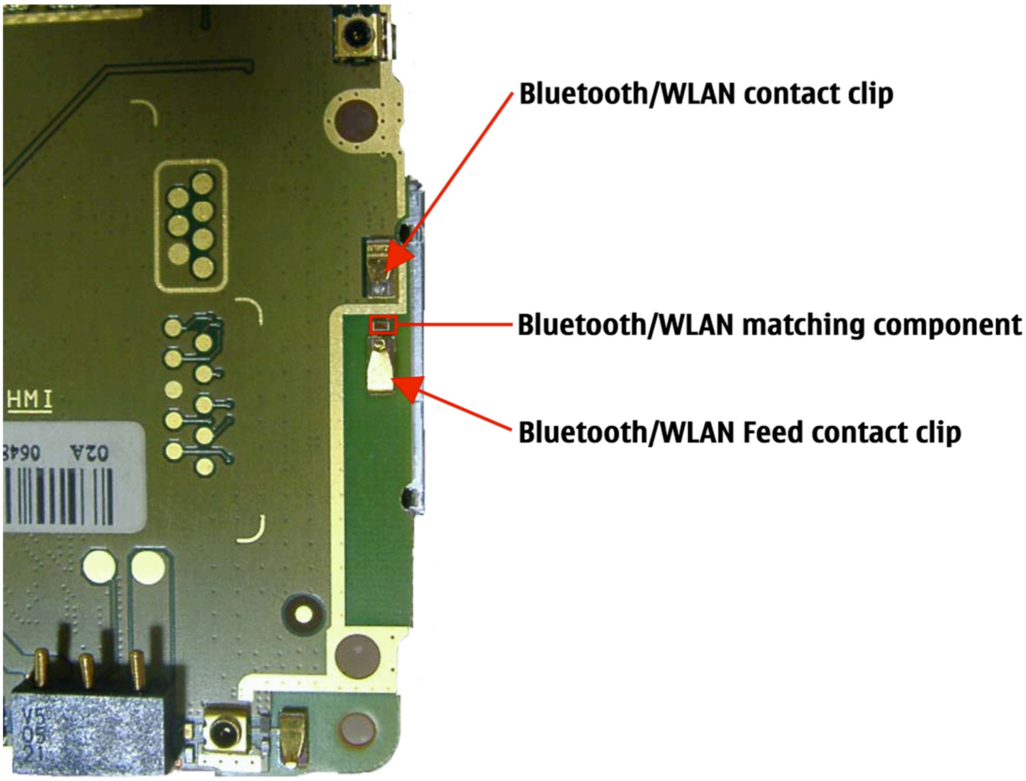
Bluetooth/WLAN contact clip
Bluetooth/WLAN matching component
Bluetooth/WLAN Feed contact clip

Figure 106 Bluetooth/WLAN antenna contacts on PWB

Note: The WCDMA antenna has two matching components, whereas the Bluetooth/WLAN antenna has only one matching component.

Frequency synthesizers

RF has separate synthesizers for Rx and Tx. Both synthesizers consist of:

- PLL (Phase-Locked Loop)
- loop filter
- VCO (Voltage Controlled Oscillator)
- balun

The VCO frequencies are locked by PLLs into a reference oscillator, VCTCXO (Voltage Controlled Temperature Compensated Crystal Oscillator).

The PLLs are located in RF ASICs and controlled via RFBus.

Reference oscillators

A 38.4MHz VCTCXO is used as a reference oscillator for the frequency synthesizers.

Regulators

All RF regulators, except one, are located in the EM ASIC N2200 in the baseband section or in the RF ASIC N7501 of the device. The discreet regulator, N7541 feeds the WCDMA PA. The EM ASIC N2200 has three regulators for RF:

1 2.78 V regulator VXO
2 4.75 V regulator VCP (VCP1 & VCP2)
3 1.35 V regulator, VB_EXT, which is the reference voltage

Frequency mappings

EGSM900 frequencies

CH	TX	RX	VCO TX	VCO RX	CH	TX	RX	VCO TX	VCO RX	CH	TX	RX	VCO TX	VCO RX
975	880,2	925,2	3520,8	3700,8	1	890,2	935,2	3560,8	3740,8	63	902,6	947,6	3610,4	3790,4
976	880,4	925,4	3521,6	3701,6	2	890,4	935,4	3561,6	3741,6	64	902,8	947,8	3611,2	3791,2
977	880,6	925,6	3522,4	3702,4	3	890,6	935,6	3562,4	3742,4	65	903,0	948,0	3612,0	3792,0
978	880,8	925,8	3523,2	3703,2	4	890,8	935,8	3563,2	3743,2	66	903,2	948,2	3612,8	3792,8
979	881,0	926,0	3524,0	3704,0	5	891,0	936,0	3564,0	3744,0	67	903,4	948,4	3613,6	3793,6
980	881,2	926,2	3524,8	3704,8	6	891,2	936,2	3564,8	3744,8	68	903,6	948,6	3614,4	3794,4
981	881,4	926,4	3525,6	3705,6	7	891,4	936,4	3565,6	3745,6	69	903,8	948,8	3615,2	3795,2
982	881,6	926,6	3526,4	3706,4	8	891,6	936,6	3566,4	3746,4	70	904,0	949,0	3616,0	3796,0
983	881,8	926,8	3527,2	3707,2	9	891,8	936,8	3567,2	3747,2	71	904,2	949,2	3616,8	3796,8
984	882,0	927,0	3528,0	3708,0	10	892,0	937,0	3568,0	3748,0	72	904,4	949,4	3617,6	3797,6
985	882,2	927,2	3528,8	3708,8	11	892,2	937,2	3568,8	3748,8	73	904,6	949,6	3618,4	3798,4
986	882,4	927,4	3529,6	3709,6	12	892,4	937,4	3569,6	3749,6	74	904,8	949,8	3619,2	3799,2
987	882,6	927,6	3530,4	3710,4	13	892,6	937,6	3570,4	3750,4	75	905,0	950,0	3620,0	3800,0
988	882,8	927,8	3531,2	3711,2	14	892,8	937,8	3571,2	3751,2	76	905,2	950,2	3620,8	3800,8
989	883,0	928,0	3532,0	3712,0	15	893,0	938,0	3572,0	3752,0	77	905,4	950,4	3621,6	3801,6
990	883,2	928,2	3532,8	3712,8	16	893,2	938,2	3572,8	3752,8	78	905,6	950,6	3622,4	3802,4
991	883,4	928,4	3533,6	3713,6	17	893,4	938,4	3573,6	3753,6	79	905,8	950,8	3623,2	3803,2
992	883,6	928,6	3534,4	3714,4	18	893,6	938,6	3574,4	3754,4	80	906,0	951,0	3624,0	3804,0
993	883,8	928,8	3535,2	3715,2	19	893,8	938,8	3575,2	3755,2	81	906,2	951,2	3624,8	3804,8
994	884,0	929,0	3536,0	3716,0	20	894,0	939,0	3576,0	3756,0	82	906,4	951,4	3625,6	3805,6
995	884,2	929,2	3536,8	3716,8	21	894,2	939,2	3576,8	3756,8	83	906,6	951,6	3626,4	3806,4
996	884,4	929,4	3537,6	3717,6	22	894,4	939,4	3577,6	3757,6	84	906,8	951,8	3627,2	3807,2
997	884,6	929,6	3538,4	3718,4	23	894,6	939,6	3578,4	3758,4	85	907,0	952,0	3628,0	3808,0
998	884,8	929,8	3539,2	3719,2	24	894,8	939,8	3579,2	3759,2	86	907,2	952,2	3628,8	3808,8
999	885,0	930,0	3540,0	3720,0	25	895,0	940,0	3580,0	3760,0	87	907,4	952,4	3629,6	3809,6
1000	885,2	930,2	3540,8	3720,8	26	895,2	940,2	3580,8	3760,8	88	907,6	952,6	3630,4	3810,4
1001	885,4	930,4	3541,6	3721,6	27	895,4	940,4	3581,6	3761,6	89	907,8	952,8	3631,2	3811,2
1002	885,6	930,6	3542,4	3722,4	28	895,6	940,6	3582,4	3762,4	90	908,0	953,0	3632,0	3812,0
1003	885,8	930,8	3543,2	3723,2	29	895,8	940,8	3583,2	3763,2	91	908,2	953,2	3632,8	3812,8
1004	886,0	931,0	3544,0	3724,0	30	896,0	941,0	3584,0	3764,0	92	908,4	953,4	3633,6	3813,6
1005	886,2	931,2	3544,8	3724,8	31	896,2	941,2	3584,8	3764,8	93	908,6	953,6	3634,4	3814,4
1006	886,4	931,4	3545,6	3725,6	32	896,4	941,4	3585,6	3765,6	94	908,8	953,8	3635,2	3815,2
1007	886,6	931,6	3546,4	3726,4	33	896,6	941,6	3586,4	3766,4	95	909,0	954,0	3636,0	3816,0
1008	886,8	931,8	3547,2	3727,2	34	896,8	941,8	3587,2	3767,2	96	909,2	954,2	3636,8	3816,8
1009	887,0	932,0	3548,0	3728,0	35	897,0	942,0	3588,0	3768,0	97	909,4	954,4	3637,6	3817,6
1010	887,2	932,2	3548,8	3728,8	36	897,2	942,2	3588,8	3768,8	98	909,6	954,6	3638,4	3818,4
1011	887,4	932,4	3549,6	3729,6	37	897,4	942,4	3589,6	3769,6	99	909,8	954,8	3639,2	3819,2
1012	887,6	932,6	3550,4	3730,4	38	897,6	942,6	3590,4	3770,4	100	910,0	955,0	3640,0	3820,0
1013	887,8	932,8	3551,2	3731,2	39	897,8	942,8	3591,2	3771,2	101	910,2	955,2	3640,8	3820,8
1014	888,0	933,0	3552,0	3732,0	40	898,0	943,0	3592,0	3772,0	102	910,4	955,4	3641,6	3821,6
1015	888,2	933,2	3552,8	3732,8	41	898,2	943,2	3592,8	3772,8	103	910,6	955,6	3642,4	3822,4
1016	888,4	933,4	3553,6	3733,6	42	898,4	943,4	3593,6	3773,6	104	910,8	955,8	3643,2	3823,2
1017	888,6	933,6	3554,4	3734,4	43	898,6	943,6	3594,4	3774,4	105	911,0	956,0	3644,0	3824,0
1018	888,8	933,8	3555,2	3735,2	44	898,8	943,8	3595,2	3775,2	106	911,2	956,2	3644,8	3824,8
1019	889,0	934,0	3556,0	3736,0	45	899,0	944,0	3596,0	3776,0	107	911,4	956,4	3645,6	3825,6
1020	889,2	934,2	3556,8	3736,8	46	899,2	944,2	3596,8	3776,8	108	911,6	956,6	3646,4	3826,4
1021	889,4	934,4	3557,6	3737,6	47	899,4	944,4	3597,6	3777,6	109	911,8	956,8	3647,2	3827,2
1022	889,6	934,6	3558,4	3738,4	48	899,6	944,6	3598,4	3778,4	110	912,0	957,0	3648,0	3828,0
1023	889,8	934,8	3559,2	3739,2	49	899,8	944,8	3599,2	3779,2	111	912,2	957,2	3648,8	3828,8
0	890,0	935,0	3560,0	3740,0	50	900,0	945,0	3600,0	3780,0	112	912,4	957,4	3649,6	3829,6
					51	900,2	945,2	3600,8	3780,8	113	912,6	957,6	3650,4	3830,4
					52	900,4	945,4	3601,6	3781,6	114	912,8	957,8	3651,2	3831,2
					53	900,6	945,6	3602,4	3782,4	115	913,0	958,0	3652,0	3832,0
					54	900,8	945,8	3603,2	3783,2	116	913,2	958,2	3652,8	3832,8
					55	901,0	946,0	3604,0	3784,0	117	913,4	958,4	3653,6	3833,6
					56	901,2	946,2	3604,8	3784,8	118	913,6	958,6	3654,4	3834,4
					57	901,4	946,4	3605,6	3785,6	119	913,8	958,8	3655,2	3835,2
					58	901,6	946,6	3606,4	3786,4	120	914,0	959,0	3656,0	3836,0
					59	901,8	946,8	3607,2	3787,2	121	914,2	959,2	3656,8	3836,8
					60	902,0	947,0	3608,0	3788,0	122	914,4	959,4	3657,6	3837,6
					61	902,2	947,2	3608,8	3788,8	123	914,6	959,6	3658,4	3838,4
					62	902,4	947,4	3609,6	3789,6	124	914,8	959,8	3659,2	3839,2

GSM1800 frequencies

Ch	Tx	Rx	VCO Tx	VCO Rx	Ch	Tx	Rx	VCO Tx	VCO Rx	Ch	Tx	Rx	VCO Tx	VCO Rx	Ch	Tx	Rx	VCO Tx	VCO Rx
512	1710.2	1805.2	3420.4	3610.4	606	1729.0	1824.0	3458.0	3648.0	700	1747.8	1842.8	3495.6	3685.6	793	1766.4	1861.4	3532.8	3722.8
513	1710.4	1805.4	3420.8	3610.8	607	1729.2	1824.2	3458.4	3648.4	701	1748.0	1843.0	3496.0	3686.0	794	1766.6	1861.6	3533.2	3723.2
514	1710.6	1805.6	3421.2	3611.2	608	1729.4	1824.4	3458.8	3648.8	702	1748.2	1843.2	3496.4	3686.4	795	1766.8	1861.8	3533.6	3723.6
515	1710.8	1805.8	3421.6	3611.6	609	1729.6	1824.6	3459.2	3649.2	703	1748.4	1843.4	3496.8	3686.8	796	1767.0	1862.0	3534.0	3724.0
516	1711.0	1806.0	3422.0	3612.0	610	1729.8	1824.8	3459.6	3649.6	704	1748.6	1843.6	3497.2	3687.2	797	1767.2	1862.2	3534.4	3724.4
517	1711.2	1806.2	3422.4	3612.4	611	1730.0	1825.0	3460.0	3650.0	705	1748.8	1843.8	3497.6	3687.6	798	1767.4	1862.4	3534.8	3724.8
518	1711.4	1806.4	3422.8	3612.8	612	1730.2	1825.2	3460.4	3650.4	706	1749.0	1844.0	3498.0	3688.0	799	1767.6	1862.6	3535.2	3725.2
519	1711.6	1806.6	3423.2	3613.2	613	1730.4	1825.4	3460.8	3650.8	707	1749.2	1844.2	3498.4	3688.4	800	1767.8	1862.8	3535.6	3725.6
520	1711.8	1806.8	3423.6	3613.6	614	1730.6	1825.6	3461.2	3651.2	708	1749.4	1844.4	3498.8	3688.8	801	1768.0	1863.0	3536.0	3726.0
521	1712.0	1807.0	3424.0	3614.0	615	1730.8	1825.8	3461.6	3651.6	709	1749.6	1844.6	3499.2	3689.2	802	1768.2	1863.2	3536.4	3726.4
522	1712.2	1807.2	3424.4	3614.4	616	1731.0	1826.0	3462.0	3652.0	710	1749.8	1844.8	3499.6	3689.6	803	1768.4	1863.4	3536.8	3726.8
523	1712.4	1807.4	3424.8	3614.8	617	1731.2	1826.2	3462.4	3652.4	711	1750.0	1845.0	3500.0	3690.0	804	1768.6	1863.6	3537.2	3727.2
524	1712.6	1807.6	3425.2	3615.2	618	1731.4	1826.4	3462.8	3652.8	712	1750.2	1845.2	3500.4	3690.4	805	1768.8	1863.8	3537.6	3727.6
525	1712.8	1807.8	3425.6	3615.6	619	1731.6	1826.6	3463.2	3653.2	713	1750.4	1845.4	3500.8	3690.8	806	1769.0	1864.0	3538.0	3728.0
526	1713.0	1808.0	3426.0	3616.0	620	1731.8	1826.8	3463.6	3653.6	714	1750.6	1845.6	3501.2	3691.2	807	1769.2	1864.2	3538.4	3728.4
527	1713.2	1808.2	3426.4	3616.4	621	1732.0	1827.0	3464.0	3654.0	715	1750.8	1845.8	3501.6	3691.6	808	1769.4	1864.4	3538.8	3728.8
528	1713.4	1808.4	3426.8	3616.8	622	1732.2	1827.2	3464.4	3654.4	716	1751.0	1846.0	3502.0	3692.0	809	1769.6	1864.6	3539.2	3729.2
529	1713.6	1808.6	3427.2	3617.2	623	1732.4	1827.4	3464.8	3654.8	717	1751.2	1846.2	3502.4	3692.4	810	1769.8	1864.8	3539.6	3729.6
530	1713.8	1808.8	3427.6	3617.6	624	1732.6	1827.6	3465.2	3655.2	718	1751.4	1846.4	3502.8	3692.8	811	1770.0	1865.0	3540.0	3730.0
531	1714.0	1809.0	3428.0	3618.0	625	1732.8	1827.8	3465.6	3655.6	719	1751.6	1846.6	3503.2	3693.2	812	1770.2	1865.2	3540.4	3730.4
532	1714.2	1809.2	3428.4	3618.4	626	1733.0	1828.0	3466.0	3656.0	720	1751.8	1846.8	3503.6	3693.6	813	1770.4	1865.4	3540.8	3730.8
533	1714.4	1809.4	3428.8	3618.8	627	1733.2	1828.2	3466.4	3656.4	721	1752.0	1847.0	3504.0	3694.0	814	1770.6	1865.6	3541.2	3731.2
534	1714.6	1809.6	3429.2	3619.2	628	1733.4	1828.4	3466.8	3656.8	722	1752.2	1847.2	3504.4	3694.4	815	1770.8	1865.8	3541.6	3731.6
535	1714.8	1809.8	3429.6	3619.6	629	1733.6	1828.6	3467.2	3657.2	723	1752.4	1847.4	3504.8	3694.8	816	1771.0	1866.0	3542.0	3732.0
536	1715.0	1810.0	3430.0	3620.0	630	1733.8	1828.8	3467.6	3657.6	724	1752.6	1847.6	3505.2	3695.2	817	1771.2	1866.2	3542.4	3732.4
537	1715.2	1810.2	3430.4	3620.4	631	1734.0	1829.0	3468.0	3658.0	725	1752.8	1847.8	3505.6	3695.6	818	1771.4	1866.4	3542.8	3732.8
538	1715.4	1810.4	3430.8	3620.8	632	1734.2	1829.2	3468.4	3658.4	726	1753.0	1848.0	3506.0	3696.0	819	1771.6	1866.6	3543.2	3733.2
539	1715.6	1810.6	3431.2	3621.2	633	1734.4	1829.4	3468.8	3658.8	727	1753.2	1848.2	3506.4	3696.4	820	1771.8	1866.8	3543.6	3733.6
540	1715.8	1810.8	3431.6	3621.6	634	1734.6	1829.6	3469.2	3659.2	728	1753.4	1848.4	3506.8	3696.8	821	1772.0	1867.0	3544.0	3734.0
541	1716.0	1811.0	3432.0	3622.0	635	1734.8	1829.8	3469.6	3659.6	729	1753.6	1848.6	3507.2	3697.2	822	1772.2	1867.2	3544.4	3734.4
542	1716.2	1811.2	3432.4	3622.4	636	1735.0	1830.0	3470.0	3660.0	730	1753.8	1848.8	3507.6	3697.6	823	1772.4	1867.4	3544.8	3734.8
543	1716.4	1811.4	3432.8	3622.8	637	1735.2	1830.2	3470.4	3660.4	731	1754.0	1849.0	3508.0	3698.0	824	1772.6	1867.6	3545.2	3735.2
544	1716.6	1811.6	3433.2	3623.2	638	1735.4	1830.4	3470.8	3660.8	732	1754.2	1849.2	3508.4	3698.4	825	1772.8	1867.8	3545.6	3735.6
545	1716.8	1811.8	3433.6	3623.6	639	1735.6	1830.6	3471.2	3661.2	733	1754.4	1849.4	3508.8	3698.8	826	1773.0	1868.0	3546.0	3736.0
546	1717.0	1812.0	3434.0	3624.0	640	1735.8	1830.8	3471.6	3661.6	734	1754.6	1849.6	3509.2	3699.2	827	1773.2	1868.2	3546.4	3736.4
547	1717.2	1812.2	3434.4	3624.4	641	1736.0	1831.0	3472.0	3662.0	735	1754.8	1849.8	3509.6	3699.6	828	1773.4	1868.4	3546.8	3736.8
548	1717.4	1812.4	3434.8	3624.8	642	1736.2	1831.2	3472.4	3662.4	736	1755.0	1850.0	3510.0	3700.0	829	1773.6	1868.6	3547.2	3737.2
549	1717.6	1812.6	3435.2	3625.2	643	1736.4	1831.4	3472.8	3662.8	737	1755.2	1850.2	3510.4	3700.4	830	1773.8	1868.8	3547.6	3737.6
550	1717.8	1812.8	3435.6	3625.6	644	1736.6	1831.6	3473.2	3663.2	738	1755.4	1850.4	3510.8	3700.8	831	1774.0	1869.0	3548.0	3738.0
551	1718.0	1813.0	3436.0	3626.0	645	1736.8	1831.8	3473.6	3663.6	739	1755.6	1850.6	3511.2	3701.2	832	1774.2	1869.2	3548.4	3738.4
552	1718.2	1813.2	3436.4	3626.4	646	1737.0	1832.0	3474.0	3664.0	740	1755.8	1850.8	3511.6	3701.6	833	1774.4	1869.4	3548.8	3738.8
553	1718.4	1813.4	3436.8	3626.8	647	1737.2	1832.2	3474.4	3664.4	741	1756.0	1851.0	3512.0	3702.0	834	1774.6	1869.6	3549.2	3739.2
554	1718.6	1813.6	3437.2	3627.2	648	1737.4	1832.4	3474.8	3664.8	742	1756.2	1851.2	3512.4	3702.4	835	1774.8	1869.8	3549.6	3739.6
555	1718.8	1813.8	3437.6	3627.6	649	1737.6	1832.6	3475.2	3665.2	743	1756.4	1851.4	3512.8	3702.8	836	1775.0	1870.0	3550.0	3740.0
556	1719.0	1814.0	3438.0	3628.0	650	1737.8	1832.8	3475.6	3665.6	744	1756.6	1851.6	3513.2	3703.2	837	1775.2	1870.2	3550.4	3740.4
557	1719.2	1814.2	3438.4	3628.4	651	1738.0	1833.0	3476.0	3666.0	745	1756.8	1851.8	3513.6	3703.6	838	1775.4	1870.4	3550.8	3740.8
558	1719.4	1814.4	3438.8	3628.8	652	1738.2	1833.2	3476.4	3666.4	746	1757.0	1852.0	3514.0	3704.0	839	1775.6	1870.6	3551.2	3741.2
559	1719.6	1814.6	3439.2	3629.2	653	1738.4	1833.4	3476.8	3666.8	747	1757.2	1852.2	3514.4	3704.4	840	1775.8	1870.8	3551.6	3741.6
560	1719.8	1814.8	3439.6	3629.6	654	1738.6	1833.6	3477.2	3667.2	748	1757.4	1852.4	3514.8	3704.8	841	1776.0	1871.0	3552.0	3742.0
561	1720.0	1815.0	3440.0	3630.0	655	1738.8	1833.8	3477.6	3667.6	749	1757.6	1852.6	3515.2	3705.2	842	1776.2	1871.2	3552.4	3742.4
562	1720.2	1815.2	3440.4	3630.4	656	1739.0	1834.0	3478.0	3668.0	750	1757.8	1852.8	3515.6	3705.6	843	1776.4	1871.4	3552.8	3742.8
563	1720.4	1815.4	3440.8	3630.8	657	1739.2	1834.2	3478.4	3668.4	751	1758.0	1853.0	3516.0	3706.0	844	1776.6	1871.6	3553.2	3743.2
564	1720.6	1815.6	3441.2	3631.2	658	1739.4	1834.4	3478.8	3668.8	752	1758.2	1853.2	3516.4	3706.4	845	1776.8	1871.8	3553.6	3743.6
565	1720.8	1815.8	3441.6	3631.6	659	1739.6	1834.6	3479.2	3669.2	753	1758.4	1853.4	3516.8	3706.8	846	1777.0	1872.0	3554.0	3744.0
566	1721.0	1816.0	3442.0	3632.0	660	1739.8	1834.8	3479.6	3669.6	754	1758.6	1853.6	3517.2	3707.2	847	1777.2	1872.2	3554.4	3744.4
567	1721.2	1816.2	3442.4	3632.4	661	1740.0	1835.0	3480.0	3670.0	755	1758.8	1853.8	3517.6	3707.6	848	1777.4	1872.4	3554.8	3744.8
568	1721.4	1816.4	3442.8	3632.8	662	1740.2	1835.2	3480.4	3670.4	756	1759.0	1854.0	3518.0	3708.0	849	1777.6	1872.6	3555.2	3745.2
569	1721.6	1816.6	3443.2	3633.2	663	1740.4	1835.4	3480.8	3670.8	757	1759.2	1854.2	3518.4	3708.4	850	1777.8	1872.8	3555.6	3745.6
570	1721.8	1816.8	3443.6	3633.6	664	1740.6	1835.6	3481.2	3671.2	758	1759.4	1854.4	3518.8	3708.8	851	1778.0	1873.0	3556.0	3746.0
571	1722.0	1817.0	3444.0	3634.0	665	1740.8	1835.8	3481.6	3671.6	759	1759.6	1854.6	3519.2	3709.2	852	1778.2	1873.2	3556.4	3746.4
572	1722.2	1817.2	3444.4	3634.4	666	1741.0	1836.0	3482.0	3672.0	760	1759.8	1854.8	3519.6	3709.6	853	1778.4	1873.4	3556.8	3746.8
573	1722.4	1817.4	3444.8	3634.8	667	1741.2	1836.2	3482.4	3672.4	761	1760.0	1855.0	3520.0	3710.0	854	1778.6	1873.6	3557.2	3747.2
574	1722.6	1817.6	3445.2	3635.2	668	1741.4	1836.4	3482.8	3672.8	762	1760.2	1855.2	3520.4	3710.4	855	1778.8	1873.8	3557.6	3747.6
575	1722.8	1817.8	3445.6	3635.6	669	1741.6	1836.6	3483.2	3673.2	763	1760.4	1855.4	3520.8	3710.8	856	1779.0	1874.0	3558.0	3748.0
576	1723.0	1818.0	3446.0	3636.0	670	1741.8	1836.8	3483.6	3673.6	764	1760.6	1855.6	3521.2	3711.2	857	1779.2	1874.2	3558.4	3748.4
577	1723.2	1818.2	3446.4	3636.4	671	1742.0	1837.0	3484.0	3674.0	765	1760.8	1855.8	3521.6	3711.6	858	1779.4	1874.4	3558.8	3748.8
578	1723.4	1818.4	3446.8	3636.8	672	1742.2	1837.2	3484.4	3674.4	766	1761.0	1856.0	3522.0	3712.0	859	1779.6	1874.6	3559.2	3749.2
579	1723.6	1818.6	3447.2	3637.2	673	1742.4	1837.4	3484.8	3674.8	767	1761.2	1856.2	3522.4	3712.4	860	1779.8	1874.8	3559.6	3749.6
580	1723.8	1818.8	3447.6	3637.6	674	1742.6	1837.6	3485.2	3675.2	768	1761.4	1856.4	3522.8	3712.8	861	1780.0	1875.0	3560.0	3750.0
581	1724.0	1819.0	3448.0	3638.0	675	1742.8	1837.8	3485.6	3675.6	769	1761.6	1856.6	3523.2	3713.2	862	1780.2	1875.2	3560.4	3750.4
582	1724.2	1819.2	3448.4	3638.4	676	1743.0	1838.0	3486.0	3676.0	770	1761.8	1856.8	3523.6	3713.6	863	1780.4	1875.4	3560.8	3750.8
583	1724.4	1819.4	3448.8	3638.8	677	1743.2	1838.2	3486.4	3676.4	771	1762.0	1857.0	3524.0	3714.0	864	1780.6	1875.6	3561.2	3751.2
584	1724.6	1819.6	3449.2	3639.2	678	1743.4	1838.4	3486.8	3676.8	772	1762.2	1857.2	3524.4	3714.4	865	1780.8	1875.8	3561.6	3751.6
585	1724.8	1819.8	3449.6	3639.6	679	1743.6	1838.6	3487.2	3677.2	773	1762.4	1857.4	3524.8	3714.8	866	1781.0	1876.0	3562.0	3752.0
586	1725.0	1820.0	3450.0	3640.0	680	1743.8	1838.8	3487.6	3677.6	774	1762.6	1857.6	3525.2	3715.2	867	1781.2	1876.2	3562.4	3752.4
587	1725.2	1820.2	3450.4	3640.4	681	1744.0	1839.0	3488.0	3678.0	775	1762.8	1857.8	3525.6	3715.6	868	1781.4	1876.4	3562.8	3752.8
588	1725.4	1820.4	3450.8	3640.8	682	1744.2	1839.2	3488.4	3678.4	776	1763.0	1858.0	3526.0	3716.0	869	1781.6	1876.6	3563.2	3753.2
589	1725.6	1820.6	3451.2	3641.2	683	1744.4	1839.4	3488.8	3678.8	777	1763.2	1858.2	3526.4	3716.4	870	1781.8	1876.8	3563.6	3753.6
590	1725.8	1820.8	3451.6	3641.6	684	1744.6	1839.6	3489.2	3679.2	778	1763.4	1858.4	3526.8	3716.8	871	1782.0	1877.0	3564.0	3754.0
591	1726.0	1821.0	3452.0	3642.0	685	1744.8	1839.8	3489.6	3679.6	779	1763.6	1858.6	3527.2	3717.2	872	1782.2	1877.2	3564.4	3754.4
592	1726.2	1821.2	3452.4	3642.4	686	1745.0	1840.0	3490.0	3680.0	780	1763.8	1858.8	3527.6	3717.6	873	1782.4	1877.4	3564.8	3754.8
593	1726.4	1821.4	3452.8	3642.8	687	1745.2	1840.2	3490.4	3680.4	781	1764.0	1859.0	3528.0	3718.0	874	1782.6	1877.6	3565.2	3755.2
594	1726.6	1821.6	3453.2	3643.2	688	1745.4	1840.4	3490.8	3680.8	782	1764.2	1859.2	3528.4	3718.4	875	1782.8	1877.8	3565.6	3755.6
595	1726.8	1821.8	3453.6	3643.6	689	1745.6	1840.6	3491.2	3681.2	783	1764.4	1859.4	3528.8	3718.8	876	1783.0	1878.0	3566.0	3756.0
596	1727.0	1822.0	3454.0	3644.0	690	1745.8	1840.8	3491.6	3681.6	784	1764.6	1859.6	3529.2	3719.2	877	1783.2	1878.2	3566.4	3756.4
597	1727.2	1822.2	3454.4	3644.4	691	1746.0	1841.0	3492.0	3682.0	785	1764.8	1859.8	3529.6	3719.6	878	1783.4	1878.4	3566.8	3756.8
598	1727.4	1822.4	3454.8	3644.8	692	1746.2	1841.2	3492.4	3682.4	786	1765.0	1860.0	3530.0	3720.0	879	1783.6	1878.6	3567.2	3757.2
599	1727.6	1822.6	3455.2	3645.2	693	1746.4	1841.4	3492.8	3682.8	787	1765.2	1860.2	3530.4	3720.4	880	1783.8	1878.8	3567.6	3757.6
600	1727.8	1822.8	3455.6	3645.6	694	1746.6	1841.6	3493.2	3683.2	788	1765.4	1860.4	3530.8	3720.8	881	1784.0	1879.0	3568.0	3758.0
601	1728.0	1823.0	3456.0	3646.0	695	1746.8	1841.8	3493.6	3683.6	789	1765.6	1860.6	3531.2	3721.2	882	1784.2	1879.2	3568.4	3758.4
602	1728.2	1823.2	3456.4	3646.4	696	1747.0	1842.0	3494.0	3684.0	790	1765.8	1860.8	3531.6	3721.6	883	1784.4	1879.4	3568.8	3758.8
603	1728.4	1823.4	3456.8	3646.8	697	1747.2	1842.2	3494.4	3684.4	791	1766.0	1861.0	3532.0	3722.0	884	1784.6	1879.6	3569.2	3759.2
604	1728.6	1823.6	3457.2	3647.2	698	1747.4	1842.4	3494.8	3684.8	792	1766.2	1861.2	3532.4	3722.4	885	1784.8	1879.8	3569.6	3759.6
605	1728.8	1823.8	3457.6	3647.6	699	1747.6	1842.6	3495.2	3685.2										

GSM1900 frequencies

CH	TX	RX	VCO TX	VCO RX	CH	TX	RX	VCO TX	VCO RX	CH	TX	RX	VCO TX	VCO RX	CH	TX	RX	VCO TX	VCO RX
512	1850,2	1930,2	3700,4	3860,4	606	1869,0	1949,0	3738,0	3898,0	700	1887,8	1967,8	3775,6	3935,6	794	1906,6	1986,6	3813,2	3973,2
513	1850,4	1930,4	3700,8	3860,8	607	1869,2	1949,2	3738,4	3898,4	701	1888,0	1968,0	3776,0	3936,0	795	1906,8	1986,8	3813,6	3973,6
514	1850,6	1930,6	3701,2	3861,2	608	1869,4	1949,4	3738,8	3898,8	702	1888,2	1968,2	3776,4	3936,4	796	1907,0	1987,0	3814,0	3974,0
515	1850,8	1930,8	3701,6	3861,6	609	1869,6	1949,6	3739,2	3899,2	703	1888,4	1968,4	3776,8	3936,8	797	1907,2	1987,2	3814,4	3974,4
516	1851,0	1931,0	3702,0	3862,0	610	1869,8	1949,8	3739,6	3899,6	704	1888,6	1968,6	3777,2	3937,2	798	1907,4	1987,4	3814,8	3974,8
517	1851,2	1931,2	3702,4	3862,4	611	1870,0	1950,0	3740,0	3900,0	705	1888,8	1968,8	3777,6	3937,6	799	1907,6	1987,6	3815,2	3975,2
518	1851,4	1931,4	3702,8	3862,8	612	1870,2	1950,2	3740,4	3900,4	706	1889,0	1969,0	3778,0	3938,0	800	1907,8	1987,8	3815,6	3975,6
519	1851,6	1931,6	3703,2	3863,2	613	1870,4	1950,4	3740,8	3900,8	707	1889,2	1969,2	3778,4	3938,4	801	1908,0	1988,0	3816,0	3976,0
520	1851,8	1931,8	3703,6	3863,6	614	1870,6	1950,6	3741,2	3901,2	708	1889,4	1969,4	3778,8	3938,8	802	1908,2	1988,2	3816,4	3976,4
521	1852,0	1932,0	3704,0	3864,0	615	1870,8	1950,8	3741,6	3901,6	709	1889,6	1969,6	3779,2	3939,2	803	1908,4	1988,4	3816,8	3976,8
522	1852,2	1932,2	3704,4	3864,4	616	1871,0	1951,0	3742,0	3902,0	710	1889,8	1969,8	3779,6	3939,6	804	1908,6	1988,6	3817,2	3977,2
523	1852,4	1932,4	3704,8	3864,8	617	1871,2	1951,2	3742,4	3902,4	711	1890,0	1970,0	3780,0	3940,0	805	1908,8	1988,8	3817,6	3977,6
524	1852,6	1932,6	3705,2	3865,2	618	1871,4	1951,4	3742,8	3902,8	712	1890,2	1970,2	3780,4	3940,4	806	1909,0	1989,0	3818,0	3978,0
525	1852,8	1932,8	3705,6	3865,6	619	1871,6	1951,6	3743,2	3903,2	713	1890,4	1970,4	3780,8	3940,8	807	1909,2	1989,2	3818,4	3978,4
526	1853,0	1933,0	3706,0	3866,0	620	1871,8	1951,8	3743,6	3903,6	714	1890,6	1970,6	3781,2	3941,2	808	1909,4	1989,4	3818,8	3978,8
527	1853,2	1933,2	3706,4	3866,4	621	1872,0	1952,0	3744,0	3904,0	715	1890,8	1970,8	3781,6	3941,6	809	1909,6	1989,6	3819,2	3979,2
528	1853,4	1933,4	3706,8	3866,8	622	1872,2	1952,2	3744,4	3904,4	716	1891,0	1971,0	3782,0	3942,0	810	1909,8	1989,8	3819,6	3979,6
529	1853,6	1933,6	3707,2	3867,2	623	1872,4	1952,4	3744,8	3904,8	717	1891,2	1971,2	3782,4	3942,4					
530	1853,8	1933,8	3707,6	3867,6	624	1872,6	1952,6	3745,2	3905,2	718	1891,4	1971,4	3782,8	3942,8					
531	1854,0	1934,0	3708,0	3868,0	625	1872,8	1952,8	3745,6	3905,6	719	1891,6	1971,6	3783,2	3943,2					
532	1854,2	1934,2	3708,4	3868,4	626	1873,0	1953,0	3746,0	3906,0	720	1891,8	1971,8	3783,6	3943,6					
533	1854,4	1934,4	3708,8	3868,8	627	1873,2	1953,2	3746,4	3906,4	721	1892,0	1972,0	3784,0	3944,0					
534	1854,6	1934,6	3709,2	3869,2	628	1873,4	1953,4	3746,8	3906,8	722	1892,2	1972,2	3784,4	3944,4					
535	1854,8	1934,8	3709,6	3869,6	629	1873,6	1953,6	3747,2	3907,2	723	1892,4	1972,4	3784,8	3944,8					
536	1855,0	1935,0	3710,0	3870,0	630	1873,8	1953,8	3747,6	3907,6	724	1892,6	1972,6	3785,2	3945,2					
537	1855,2	1935,2	3710,4	3870,4	631	1874,0	1954,0	3748,0	3908,0	725	1892,8	1972,8	3785,6	3945,6					
538	1855,4	1935,4	3710,8	3870,8	632	1874,2	1954,2	3748,4	3908,4	726	1893,0	1973,0	3786,0	3946,0					
539	1855,6	1935,6	3711,2	3871,2	633	1874,4	1954,4	3748,8	3908,8	727	1893,2	1973,2	3786,4	3946,4					
540	1855,8	1935,8	3711,6	3871,6	634	1874,6	1954,6	3749,2	3909,2	728	1893,4	1973,4	3786,8	3946,8					
541	1856,0	1936,0	3712,0	3872,0	635	1874,8	1954,8	3749,6	3909,6	729	1893,6	1973,6	3787,2	3947,2					
542	1856,2	1936,2	3712,4	3872,4	636	1875,0	1955,0	3750,0	3910,0	730	1893,8	1973,8	3787,6	3947,6					
543	1856,4	1936,4	3712,8	3872,8	637	1875,2	1955,2	3750,4	3910,4	731	1894,0	1974,0	3788,0	3948,0					
544	1856,6	1936,6	3713,2	3873,2	638	1875,4	1955,4	3750,8	3910,8	732	1894,2	1974,2	3788,4	3948,4					
545	1856,8	1936,8	3713,6	3873,6	639	1875,6	1955,6	3751,2	3911,2	733	1894,4	1974,4	3788,8	3948,8					
546	1857,0	1937,0	3714,0	3874,0	640	1875,8	1955,8	3751,6	3911,6	734	1894,6	1974,6	3789,2	3949,2					
547	1857,2	1937,2	3714,4	3874,4	641	1876,0	1956,0	3752,0	3912,0	735	1894,8	1974,8	3789,6	3949,6					
548	1857,4	1937,4	3714,8	3874,8	642	1876,2	1956,2	3752,4	3912,4	736	1895,0	1975,0	3790,0	3950,0					
549	1857,6	1937,6	3715,2	3875,2	643	1876,4	1956,4	3752,8	3912,8	737	1895,2	1975,2	3790,4	3950,4					
550	1857,8	1937,8	3715,6	3875,6	644	1876,6	1956,6	3753,2	3913,2	738	1895,4	1975,4	3790,8	3950,8					
551	1858,0	1938,0	3716,0	3876,0	645	1876,8	1956,8	3753,6	3913,6	739	1895,6	1975,6	3791,2	3951,2					
552	1858,2	1938,2	3716,4	3876,4	646	1877,0	1957,0	3754,0	3914,0	740	1895,8	1975,8	3791,6	3951,6					
553	1858,4	1938,4	3716,8	3876,8	647	1877,2	1957,2	3754,4	3914,4	741	1896,0	1976,0	3792,0	3952,0					
554	1858,6	1938,6	3717,2	3877,2	648	1877,4	1957,4	3754,8	3914,8	742	1896,2	1976,2	3792,4	3952,4					
555	1858,8	1938,8	3717,6	3877,6	649	1877,6	1957,6	3755,2	3915,2	743	1896,4	1976,4	3792,8	3952,8					
556	1859,0	1939,0	3718,0	3878,0	650	1877,8	1957,8	3755,6	3915,6	744	1896,6	1976,6	3793,2	3953,2					
557	1859,2	1939,2	3718,4	3878,4	651	1878,0	1958,0	3756,0	3916,0	745	1896,8	1976,8	3793,6	3953,6					
558	1859,4	1939,4	3718,8	3878,8	652	1878,2	1958,2	3756,4	3916,4	746	1897,0	1977,0	3794,0	3954,0					
559	1859,6	1939,6	3719,2	3879,2	653	1878,4	1958,4	3756,8	3916,8	747	1897,2	1977,2	3794,4	3954,4					
560	1859,8	1939,8	3719,6	3879,6	654	1878,6	1958,6	3757,2	3917,2	748	1897,4	1977,4	3794,8	3954,8					
561	1860,0	1940,0	3720,0	3880,0	655	1878,8	1958,8	3757,6	3917,6	749	1897,6	1977,6	3795,2	3955,2					
562	1860,2	1940,2	3720,4	3880,4	656	1879,0	1959,0	3758,0	3918,0	750	1897,8	1977,8	3795,6	3955,6					
563	1860,4	1940,4	3720,8	3880,8	657	1879,2	1959,2	3758,4	3918,4	751	1898,0	1978,0	3796,0	3956,0					
564	1860,6	1940,6	3721,2	3881,2	658	1879,4	1959,4	3758,8	3918,8	752	1898,2	1978,2	3796,4	3956,4					
565	1860,8	1940,8	3721,6	3881,6	659	1879,6	1959,6	3759,2	3919,2	753	1898,4	1978,4	3796,8	3956,8					
566	1861,0	1941,0	3722,0	3882,0	660	1879,8	1959,8	3759,6	3919,6	754	1898,6	1978,6	3797,2	3957,2					
567	1861,2	1941,2	3722,4	3882,4	661	1880,0	1960,0	3760,0	3920,0	755	1898,8	1978,8	3797,6	3957,6					
568	1861,4	1941,4	3722,8	3882,8	662	1880,2	1960,2	3760,4	3920,4	756	1899,0	1979,0	3798,0	3958,0					
569	1861,6	1941,6	3723,2	3883,2	663	1880,4	1960,4	3760,8	3920,8	757	1899,2	1979,2	3798,4	3958,4					
570	1861,8	1941,8	3723,6	3883,6	664	1880,6	1960,6	3761,2	3921,2	758	1899,4	1979,4	3798,8	3958,8					
571	1862,0	1942,0	3724,0	3884,0	665	1880,8	1960,8	3761,6	3921,6	759	1899,6	1979,6	3799,2	3959,2					
572	1862,2	1942,2	3724,4	3884,4	666	1881,0	1961,0	3762,0	3922,0	760	1899,8	1979,8	3799,6	3959,6					
573	1862,4	1942,4	3724,8	3884,8	667	1881,2	1961,2	3762,4	3922,4	761	1900,0	1980,0	3800,0	3960,0					
574	1862,6	1942,6	3725,2	3885,2	668	1881,4	1961,4	3762,8	3922,8	762	1900,2	1980,2	3800,4	3960,4					
575	1862,8	1942,8	3725,6	3885,6	669	1881,6	1961,6	3763,2	3923,2	763	1900,4	1980,4	3800,8	3960,8					
576	1863,0	1943,0	3726,0	3886,0	670	1881,8	1961,8	3763,6	3923,6	764	1900,6	1980,6	3801,2	3961,2					
577	1863,2	1943,2	3726,4	3886,4	671	1882,0	1962,0	3764,0	3924,0	765	1900,8	1980,8	3801,6	3961,6					
578	1863,4	1943,4	3726,8	3886,8	672	1882,2	1962,2	3764,4	3924,4	766	1901,0	1981,0	3802,0	3962,0					
579	1863,6	1943,6	3727,2	3887,2	673	1882,4	1962,4	3764,8	3924,8	767	1901,2	1981,2	3802,4	3962,4					
580	1863,8	1943,8	3727,6	3887,6	674	1882,6	1962,6	3765,2	3925,2	768	1901,4	1981,4	3802,8	3962,8					
581	1864,0	1944,0	3728,0	3888,0	675	1882,8	1962,8	3765,6	3925,6	769	1901,6	1981,6	3803,2	3963,2					
582	1864,2	1944,2	3728,4	3888,4	676	1883,0	1963,0	3766,0	3926,0	770	1901,8	1981,8	3803,6	3963,6					
583	1864,4	1944,4	3728,8	3888,8	677	1883,2	1963,2	3766,4	3926,4	771	1902,0	1982,0	3804,0	3964,0					
584	1864,6	1944,6	3729,2	3889,2	678	1883,4	1963,4	3766,8	3926,8	772	1902,2	1982,2	3804,4	3964,4					
585	1864,8	1944,8	3729,6	3889,6	679	1883,6	1963,6	3767,2	3927,2	773	1902,4	1982,4	3804,8	3964,8					
586	1865,0	1945,0	3730,0	3890,0	680	1883,8	1963,8	3767,6	3927,6	774	1902,6	1982,6	3805,2	3965,2					
587	1865,2	1945,2	3730,4	3890,4	681	1884,0	1964,0	3768,0	3928,0	775	1902,8	1982,8	3805,6	3965,6					
588	1865,4	1945,4	3730,8	3890,8	682	1884,2	1964,2	3768,4	3928,4	776	1903,0	1983,0	3806,0	3966,0					
589	1865,6	1945,6	3731,2	3891,2	683	1884,4	1964,4	3768,8	3928,8	777	1903,2	1983,2	3806,4	3966,4					
590	1865,8	1945,8	3731,6	3891,6	684	1884,6	1964,6	3769,2	3929,2	778	1903,4	1983,4	3806,8	3966,8					
591	1866,0	1946,0	3732,0	3892,0	685	1884,8	1964,8	3769,6	3929,6	779	1903,6	1983,6	3807,2	3967,2					
592	1866,2	1946,2	3732,4	3892,4	686	1885,0	1965,0	3770,0	3930,0	780	1903,8	1983,8	3807,6	3967,6					
593	1866,4	1946,4	3732,8	3892,8	687	1885,2	1965,2	3770,4	3930,4	781	1904,0	1984,0	3808,0	3968,0					
594	1866,6	1946,6	3733,2	3893,2	688	1885,4	1965,4	3770,8	3930,8	782	1904,2	1984,2	3808,4	3968,4					
595	1866,8	1946,8	3733,6	3893,6	689	1885,6	1965,6	3771,2	3931,2	783	1904,4	1984,4	3808,8	3968,8					
596	1867,0	1947,0	3734,0	3894,0	690	1885,8	1965,8	3771,6	3931,6	784	1904,6	1984,6	3809,2	3969,2					
597	1867,2	1947,2	3734,4	3894,4	691	1886,0	1966,0	3772,0	3932,0	785	1904,8	1984,8	3809,6	3969,6					
598	1867,4	1947,4	3734,8	3894,8	692	1886,2	1966,2	3772,4	3932,4	786	1905,0	1985,0	3810,0	3970,0					
599	1867,6	1947,6	3735,2	3895,2	693	1886,4	1966,4	3772,8	3932,8	787	1905,2	1985,2	3810,4	3970,4					
600	1867,8	1947,8	3735,6	3895,6	694	1886,6	1966,6	3773,2	3933,2	788	1905,4	1985,4	3810,8	3970,8					
601	1868,0	1948,0	3736,0	3896,0	695	1886,8	1966,8	3773,6	3933,6	789	1905,6	1985,6	3811,2	3971,2					
602	1868,2	1948,2	3736,4	3896,4	696	1887,0	1967,0	3774,0	3934,0	790	1905,8	1985,8	3811,6	3971,6					
603	1868,4	1948,4	3736,8	3896,8	697	1887,2	1967,2	3774,4	3934,4	791	1906,0	1986,0	3812,0	3972,0					
604	1868,6	1948,6	3737,2	3897,2	698	1887,4	1967,4	3774,8	3934,8	792	1906,2	1986,2	3812,4	3972,4					
605	1868,8	1948,8	3737,6	3897,6	699	1887,6	1967,6	3775,2	3935,2	793	1906,4	1986,4	3812,8	3972,8					

WCDMA 2100 Rx frequencies

Ch	RX	VCO RX	Ch	RX	VCO RX	Ch	RX	VCO RX	Ch	RX	VCO RX	Ch	RX	VCO RX
10562	2112.4	4224.8	10625	2125	4250	10688	2137.6	4275.2	10751	2150.2	4300.4	10814	2162.8	4325.6
10563	2112.6	4225.2	10626	2125.2	4250.4	10689	2137.8	4275.6	10752	2150.4	4300.8	10815	2163	4326
10564	2112.8	4225.6	10627	2125.4	4250.8	10690	2138	4276	10753	2150.6	4301.2	10816	2163.2	4326.4
10565	2113	4226	10628	2125.6	4251.2	10691	2138.2	4276.4	10754	2150.8	4301.6	10817	2163.4	4326.8
10566	2113.2	4226.4	10629	2125.8	4251.6	10692	2138.4	4276.8	10755	2151	4302	10818	2163.6	4327.2
10567	2113.4	4226.8	10630	2126	4252	10693	2138.6	4277.2	10756	2151.2	4302.4	10819	2163.8	4327.6
10568	2113.6	4227.2	10631	2126.2	4252.4	10694	2138.8	4277.6	10757	2151.4	4302.8	10820	2164	4328
10569	2113.8	4227.6	10632	2126.4	4252.8	10695	2139	4278	10758	2151.6	4303.2	10821	2164.2	4328.4
10570	2114	4228	10633	2126.6	4253.2	10696	2139.2	4278.4	10759	2151.8	4303.6	10822	2164.4	4328.8
10571	2114.2	4228.4	10634	2126.8	4253.6	10697	2139.4	4278.8	10760	2152	4304	10823	2164.6	4329.2
10572	2114.4	4228.8	10635	2127	4254	10698	2139.6	4279.2	10761	2152.2	4304.4	10824	2164.8	4329.6
10573	2114.6	4229.2	10636	2127.2	4254.4	10699	2139.8	4279.6	10762	2152.4	4304.8	10825	2165	4330
10574	2114.8	4229.6	10637	2127.4	4254.8	10700	2140	4280	10763	2152.6	4305.2	10826	2165.2	4330.4
10575	2115	4230	10638	2127.6	4255.2	10701	2140.2	4280.4	10764	2152.8	4305.6	10827	2165.4	4330.8
10576	2115.2	4230.4	10639	2127.8	4255.6	10702	2140.4	4280.8	10765	2153	4306	10828	2165.6	4331.2
10577	2115.4	4230.8	10640	2128	4256	10703	2140.6	4281.2	10766	2153.2	4306.4	10829	2165.8	4331.6
10578	2115.6	4231.2	10641	2128.2	4256.4	10704	2140.8	4281.6	10767	2153.4	4306.8	10830	2166	4332
10579	2115.8	4231.6	10642	2128.4	4256.8	10705	2141	4282	10768	2153.6	4307.2	10831	2166.2	4332.4
10580	2116	4232	10643	2128.6	4257.2	10706	2141.2	4282.4	10769	2153.8	4307.6	10832	2166.4	4332.8
10581	2116.2	4232.4	10644	2128.8	4257.6	10707	2141.4	4282.8	10770	2154	4308	10833	2166.6	4333.2
10582	2116.4	4232.8	10645	2129	4258	10708	2141.6	4283.2	10771	2154.2	4308.4	10834	2166.8	4333.6
10583	2116.6	4233.2	10646	2129.2	4258.4	10709	2141.8	4283.6	10772	2154.4	4308.8	10835	2167	4334
10584	2116.8	4233.6	10647	2129.4	4258.8	10710	2142	4284	10773	2154.6	4309.2	10836	2167.2	4334.4
10585	2117	4234	10648	2129.6	4259.2	10711	2142.2	4284.4	10774	2154.8	4309.6	10837	2167.4	4334.8
10586	2117.2	4234.4	10649	2129.8	4259.6	10712	2142.4	4284.8	10775	2155	4310	10838	2167.6	4335.2
10587	2117.4	4234.8	10650	2130	4260	10713	2142.6	4285.2	10776	2155.2	4310.4			
10588	2117.6	4235.2	10651	2130.2	4260.4	10714	2142.8	4285.6	10777	2155.4	4310.8			
10589	2117.8	4235.6	10652	2130.4	4260.8	10715	2143	4286	10778	2155.6	4311.2			
10590	2118	4236	10653	2130.6	4261.2	10716	2143.2	4286.4	10779	2155.8	4311.6			
10591	2118.2	4236.4	10654	2130.8	4261.6	10717	2143.4	4286.8	10780	2156	4312			
10592	2118.4	4236.8	10655	2131	4262	10718	2143.6	4287.2	10781	2156.2	4312.4			
10593	2118.6	4237.2	10656	2131.2	4262.4	10719	2143.8	4287.6	10782	2156.4	4312.8			
10594	2118.8	4237.6	10657	2131.4	4262.8	10720	2144	4288	10783	2156.6	4313.2			
10595	2119	4238	10658	2131.6	4263.2	10721	2144.2	4288.4	10784	2156.8	4313.6			
10596	2119.2	4238.4	10659	2131.8	4263.6	10722	2144.4	4288.8	10785	2157	4314			
10597	2119.4	4238.8	10660	2132	4264	10723	2144.6	4289.2	10786	2157.2	4314.4			
10598	2119.6	4239.2	10661	2132.2	4264.4	10724	2144.8	4289.6	10787	2157.4	4314.8			
10599	2119.8	4239.6	10662	2132.4	4264.8	10725	2145	4290	10788	2157.6	4315.2			
10600	2120	4240	10663	2132.6	4265.2	10726	2145.2	4290.4	10789	2157.8	4315.6			
10601	2120.2	4240.4	10664	2132.8	4265.6	10727	2145.4	4290.8	10790	2158	4316			
10602	2120.4	4240.8	10665	2133	4266	10728	2145.6	4291.2	10791	2158.2	4316.4			
10603	2120.6	4241.2	10666	2133.2	4266.4	10729	2145.8	4291.6	10792	2158.4	4316.8			
10604	2120.8	4241.6	10667	2133.4	4266.8	10730	2146	4292	10793	2158.6	4317.2			
10605	2121	4242	10668	2133.6	4267.2	10731	2146.2	4292.4	10794	2158.8	4317.6			
10606	2121.2	4242.4	10669	2133.8	4267.6	10732	2146.4	4292.8	10795	2159	4318			
10607	2121.4	4242.8	10670	2134	4268	10733	2146.6	4293.2	10796	2159.2	4318.4			
10608	2121.6	4243.2	10671	2134.2	4268.4	10734	2146.8	4293.6	10797	2159.4	4318.8			
10609	2121.8	4243.6	10672	2134.4	4268.8	10735	2147	4294	10798	2159.6	4319.2			
10610	2122	4244	10673	2134.6	4269.2	10736	2147.2	4294.4	10799	2159.8	4319.6			
10611	2122.2	4244.4	10674	2134.8	4269.6	10737	2147.4	4294.8	10800	2160	4320			
10612	2122.4	4244.8	10675	2135	4270	10738	2147.6	4295.2	10801	2160.2	4320.4			
10613	2122.6	4245.2	10676	2135.2	4270.4	10739	2147.8	4295.6	10802	2160.4	4320.8			
10614	2122.8	4245.6	10677	2135.4	4270.8	10740	2148	4296	10803	2160.6	4321.2			
10615	2123	4246	10678	2135.6	4271.2	10741	2148.2	4296.4	10804	2160.8	4321.6			
10616	2123.2	4246.4	10679	2135.8	4271.6	10742	2148.4	4296.8	10805	2161	4322			
10617	2123.4	4246.8	10680	2136	4272	10743	2148.6	4297.2	10806	2161.2	4322.4			
10618	2123.6	4247.2	10681	2136.2	4272.4	10744	2148.8	4297.6	10807	2161.4	4322.8			
10619	2123.8	4247.6	10682	2136.4	4272.8	10745	2149	4298	10808	2161.6	4323.2			
10620	2124	4248	10683	2136.6	4273.2	10746	2149.2	4298.4	10809	2161.8	4323.6			
10621	2124.2	4248.4	10684	2136.8	4273.6	10747	2149.4	4298.8	10810	2162	4324			
10622	2124.4	4248.8	10685	2137	4274	10748	2149.6	4299.2	10811	2162.2	4324.4			
10623	2124.6	4249.2	10686	2137.2	4274.4	10749	2149.8	4299.6	10812	2162.4	4324.8			
10624	2124.8	4249.6	10687	2137.4	4274.8	10750	2150	4300	10813	2162.6	4325.2			

WCDMA 2100 Tx frequencies

Ch	Tx	VCO Tx	Ch	Tx	VCO Tx	Ch	Tx	VCO Tx	Ch	Tx	VCO Tx	Ch	Tx	VCO Tx
9612	1922.4	3844.8	9671	1934.2	3868.4	9730	1946	3892	9789	1957.8	3915.6	9848	1969.6	3939.2
9613	1922.6	3845.2	9672	1934.4	3868.8	9731	1946.2	3892.4	9790	1958	3916	9849	1969.8	3939.6
9614	1922.8	3845.6	9673	1934.6	3869.2	9732	1946.4	3892.8	9791	1958.2	3916.4	9850	1970	3940
9615	1923	3846	9674	1934.8	3869.6	9733	1946.6	3893.2	9792	1958.4	3916.8	9851	1970.2	3940.4
9616	1923.2	3846.4	9675	1935	3870	9734	1946.8	3893.6	9793	1958.6	3917.2	9852	1970.4	3940.8
9617	1923.4	3846.8	9676	1935.2	3870.4	9735	1947	3894	9794	1958.8	3917.6	9853	1970.6	3941.2
9618	1923.6	3847.2	9677	1935.4	3870.8	9736	1947.2	3894.4	9795	1959	3918	9854	1970.8	3941.6
9619	1923.8	3847.6	9678	1935.6	3871.2	9737	1947.4	3894.8	9796	1959.2	3918.4	9855	1971	3942
9620	1924	3848	9679	1935.8	3871.6	9738	1947.6	3895.2	9797	1959.4	3918.8	9856	1971.2	3942.4
9621	1924.2	3848.4	9680	1936	3872	9739	1947.8	3895.6	9798	1959.6	3919.2	9857	1971.4	3942.8
9622	1924.4	3848.8	9681	1936.2	3872.4	9740	1948	3896	9799	1959.8	3919.6	9858	1971.6	3943.2
9623	1924.6	3849.2	9682	1936.4	3872.8	9741	1948.2	3896.4	9800	1960	3920	9859	1971.8	3943.6
9624	1924.8	3849.6	9683	1936.6	3873.2	9742	1948.4	3896.8	9801	1960.2	3920.4	9860	1972	3944
9625	1925	3850	9684	1936.8	3873.6	9743	1948.6	3897.2	9802	1960.4	3920.8	9861	1972.2	3944.4
9626	1925.2	3850.4	9685	1937	3874	9744	1948.8	3897.6	9803	1960.6	3921.2	9862	1972.4	3944.8
9627	1925.4	3850.8	9686	1937.2	3874.4	9745	1949	3898	9804	1960.8	3921.6	9863	1972.6	3945.2
9628	1925.6	3851.2	9687	1937.4	3874.8	9746	1949.2	3898.4	9805	1961	3922	9864	1972.8	3945.6
9629	1925.8	3851.6	9688	1937.6	3875.2	9747	1949.4	3898.8	9806	1961.2	3922.4	9865	1973	3946
9630	1926	3852	9689	1937.8	3875.6	9748	1949.6	3899.2	9807	1961.4	3922.8	9866	1973.2	3946.4
9631	1926.2	3852.4	9690	1938	3876	9749	1949.8	3899.6	9808	1961.6	3923.2	9867	1973.4	3946.8
9632	1926.4	3852.8	9691	1938.2	3876.4	9750	1950	3900	9809	1961.8	3923.6	9868	1973.6	3947.2
9633	1926.6	3853.2	9692	1938.4	3876.8	9751	1950.2	3900.4	9810	1962	3924	9869	1973.8	3947.6
9634	1926.8	3853.6	9693	1938.6	3877.2	9752	1950.4	3900.8	9811	1962.2	3924.4	9870	1974	3948
9635	1927	3854	9694	1938.8	3877.6	9753	1950.6	3901.2	9812	1962.4	3924.8	9871	1974.2	3948.4
9636	1927.2	3854.4	9695	1939	3878	9754	1950.8	3901.6	9813	1962.6	3925.2	9872	1974.4	3948.8
9637	1927.4	3854.8	9696	1939.2	3878.4	9755	1951	3902	9814	1962.8	3925.6	9873	1974.6	3949.2
9638	1927.6	3855.2	9697	1939.4	3878.8	9756	1951.2	3902.4	9815	1963	3926	9874	1974.8	3949.6
9639	1927.8	3855.6	9698	1939.6	3879.2	9757	1951.4	3902.8	9816	1963.2	3926.4	9875	1975	3950
9640	1928	3856	9699	1939.8	3879.6	9758	1951.6	3903.2	9817	1963.4	3926.8	9876	1975.2	3950.4
9641	1928.2	3856.4	9700	1940	3880	9759	1951.8	3903.6	9818	1963.6	3927.2	9877	1975.4	3950.8
9642	1928.4	3856.8	9701	1940.2	3880.4	9760	1952	3904	9819	1963.8	3927.6	9878	1975.6	3951.2
9643	1928.6	3857.2	9702	1940.4	3880.8	9761	1952.2	3904.4	9820	1964	3928	9879	1975.8	3951.6
9644	1928.8	3857.6	9703	1940.6	3881.2	9762	1952.4	3904.8	9821	1964.2	3928.4	9880	1976	3952
9645	1929	3858	9704	1940.8	3881.6	9763	1952.6	3905.2	9822	1964.4	3928.8	9881	1976.2	3952.4
9646	1929.2	3858.4	9705	1941	3882	9764	1952.8	3905.6	9823	1964.6	3929.2	9882	1976.4	3952.8
9647	1929.4	3858.8	9706	1941.2	3882.4	9765	1953	3906	9824	1964.8	3929.6	9883	1976.6	3953.2
9648	1929.6	3859.2	9707	1941.4	3882.8	9766	1953.2	3906.4	9825	1965	3930	9884	1976.8	3953.6
9649	1929.8	3859.6	9708	1941.6	3883.2	9767	1953.4	3906.8	9826	1965.2	3930.4	9885	1977	3954
9650	1930	3860	9709	1941.8	3883.6	9768	1953.6	3907.2	9827	1965.4	3930.8	9886	1977.2	3954.4
9651	1930.2	3860.4	9710	1942	3884	9769	1953.8	3907.6	9828	1965.6	3931.2	9887	1977.4	3954.8
9652	1930.4	3860.8	9711	1942.2	3884.4	9770	1954	3908	9829	1965.8	3931.6	9888	1977.6	3955.2
9653	1930.6	3861.2	9712	1942.4	3884.8	9771	1954.2	3908.4	9830	1966	3932			
9654	1930.8	3861.6	9713	1942.6	3885.2	9772	1954.4	3908.8	9831	1966.2	3932.4			
9655	1931	3862	9714	1942.8	3885.6	9773	1954.6	3909.2	9832	1966.4	3932.8			
9656	1931.2	3862.4	9715	1943	3886	9774	1954.8	3909.6	9833	1966.6	3933.2			
9657	1931.4	3862.8	9716	1943.2	3886.4	9775	1955	3910	9834	1966.8	3933.6			
9658	1931.6	3863.2	9717	1943.4	3886.8	9776	1955.2	3910.4	9835	1967	3934			
9659	1931.8	3863.6	9718	1943.6	3887.2	9777	1955.4	3910.8	9836	1967.2	3934.4			
9660	1932	3864	9719	1943.8	3887.6	9778	1955.6	3911.2	9837	1967.4	3934.8			
9661	1932.2	3864.4	9720	1944	3888	9779	1955.8	3911.6	9838	1967.6	3935.2			
9662	1932.4	3864.8	9721	1944.2	3888.4	9780	1956	3912	9839	1967.8	3935.6			
9663	1932.6	3865.2	9722	1944.4	3888.8	9781	1956.2	3912.4	9840	1968	3936			
9664	1932.8	3865.6	9723	1944.6	3889.2	9782	1956.4	3912.8	9841	1968.2	3936.4			
9665	1933	3866	9724	1944.8	3889.6	9783	1956.6	3913.2	9842	1968.4	3936.8			
9666	1933.2	3866.4	9725	1945	3890	9784	1956.8	3913.6	9843	1968.6	3937.2			
9667	1933.4	3866.8	9726	1945.2	3890.4	9785	1957	3914	9844	1968.8	3937.6			
9668	1933.6	3867.2	9727	1945.4	3890.8	9786	1957.2	3914.4	9845	1969	3938			
9669	1933.8	3867.6	9728	1945.6	3891.2	9787	1957.4	3914.8	9846	1969.2	3938.4			
9670	1934	3868	9729	1945.8	3891.6	9788	1957.6	3915.2	9847	1969.4	3938.8			

10 — Schematics

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Menelaus, SIM, miniSD........10–8
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UI PWB........10–11
Flip PWB........10–12
Camera PWB........10–13
BTFM, WLAN........10–14
RF part........10–15
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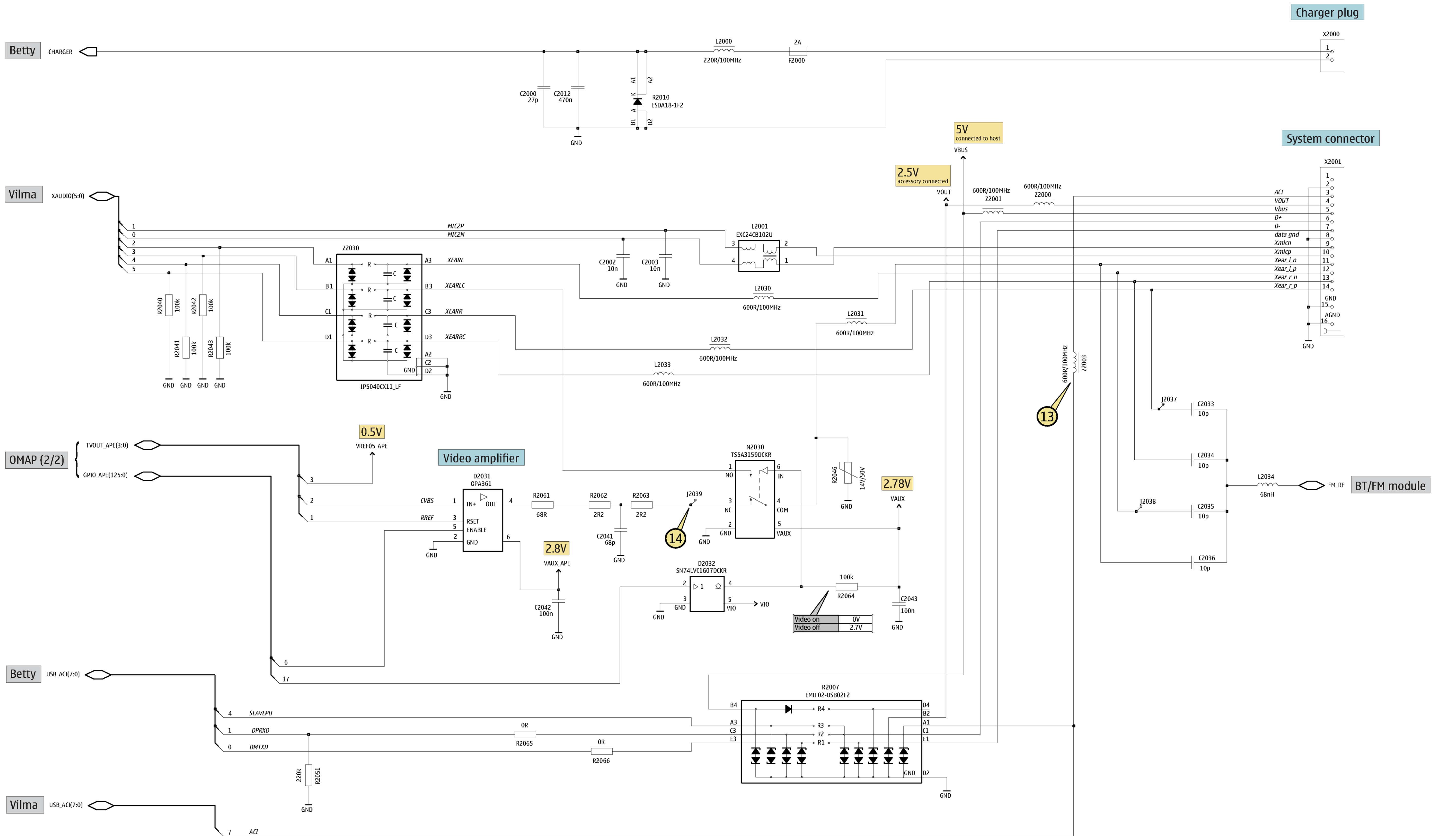
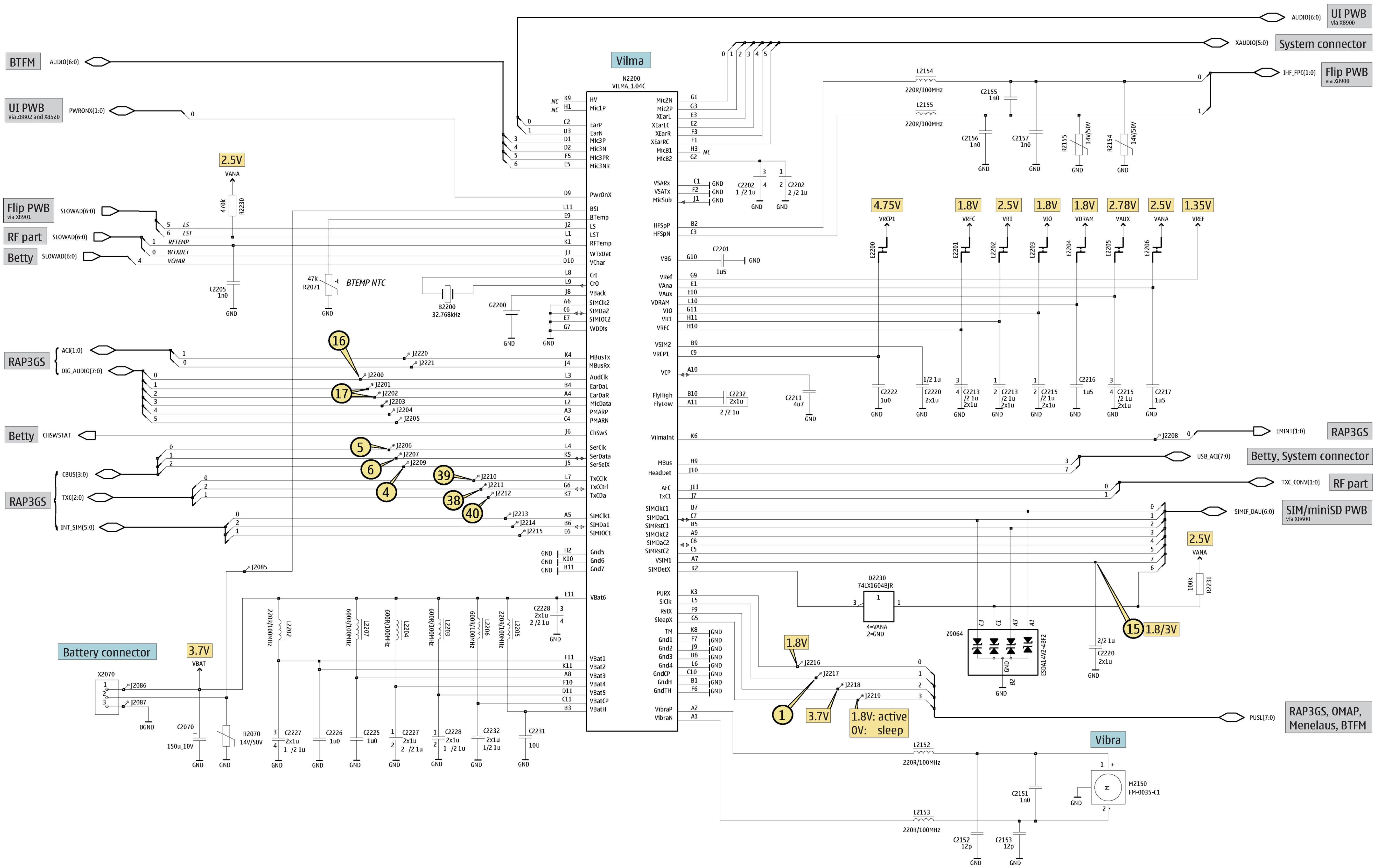
Component finder........10–17

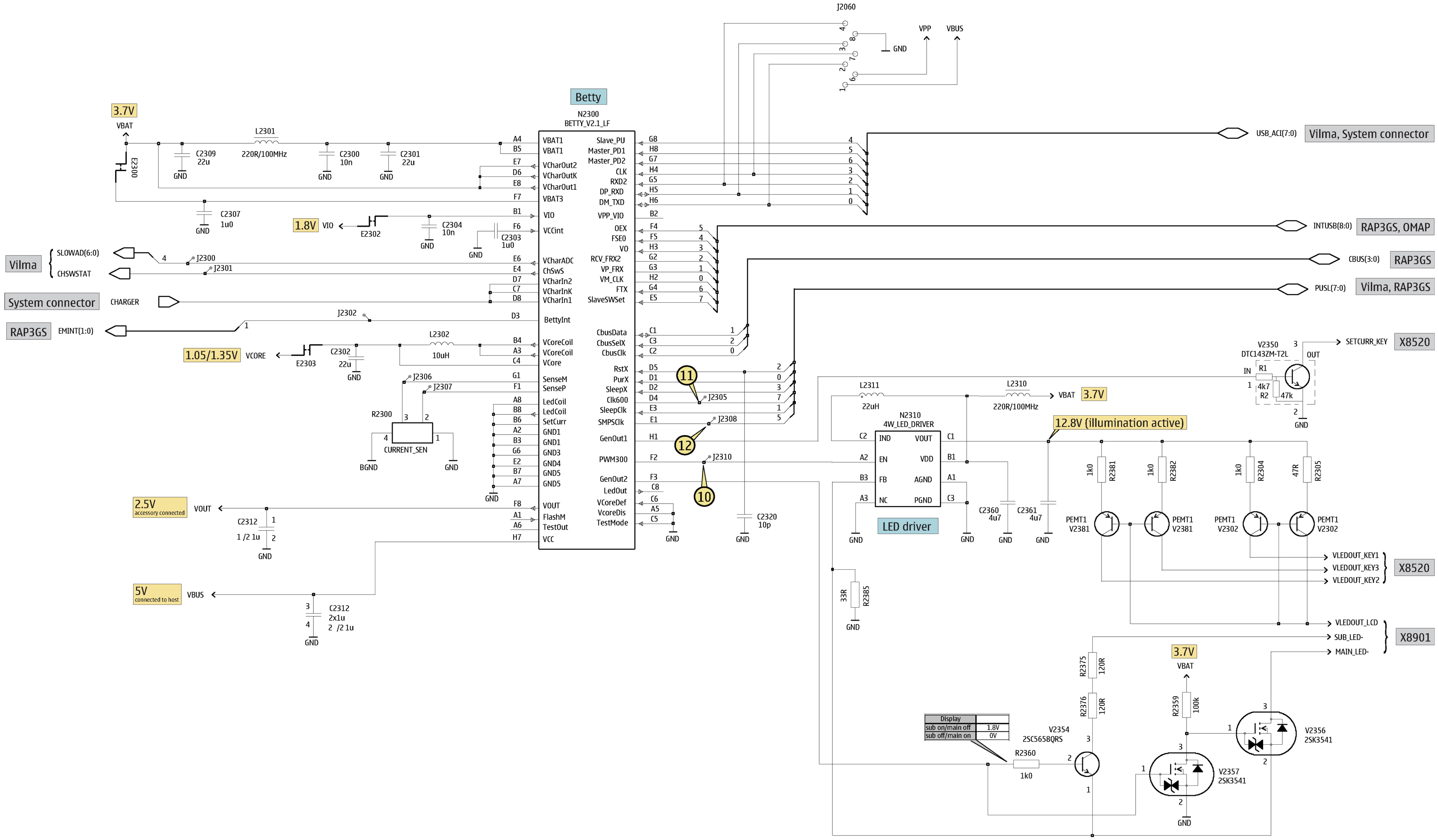
System connector


Charger plug
X2000
Betty
CHARGER
L2000
220R/100MHz
2A
F2000
C2000
27p
C2012
470n
R2010
ESDA18-1F2
GND
5V
connected to host
VBUS
System connector
X2001
2.5V
accessory connected
VOUT
600R/100MHz
Z2001
Z2000
ACI
VOUT
Vbus
D+
D-
data gnd
Xmicn
Xmicp
Xear_l_n
Xear_l_p
Xear_r_n
Xear_r_p
GND
AGND
Vilma
XAUDIO(5:0)
MIC2P
MIC2N
XEARL
XEARLC
XEARR
XEARRC
Z2030
IP5040CX11_LF
L2001
EXC24CB102U
C2002
10n
C2003
10n
L2030
L2031
L2032
L2033
R2040
R2041
R2042
R2043
100k
Z2003
13
J2037
C2033
10p
C2034
C2035
C2036
J2038
L2034
68nH
FM_RF
BT/FM module
OMAP (2/2)
TVOUT_APE(3:0)
GPIO_APE(125:0)
0.5V
VREF05_APE
Video amplifier
D2031
OPA361
CVBS
RREF
IN+
OUT
RSET
ENABLE
R2061
68R
R2062
2R2
R2063
2R2
C2041
68p
J2039
14
2.8V
VAUX_APE
C2042
100n
N2030
TS5A3159DCKR
NO
NC
IN
COM
VAUX
R2046
14V/50V
2.78V
VAUX
D2032
SN74LVC1G07DCKR
VIO
R2064
100k
C2043
100n
Video on | 0V
Video off | 2.7V
Betty
USB_ACI(7:0)
SLAVEPU
DPRXD
DMTXD
R2065
0R
R2066
R2051
220k
R2007
EMIF02-USB02F2
Vilma
USB_ACI(7:0)
ACI

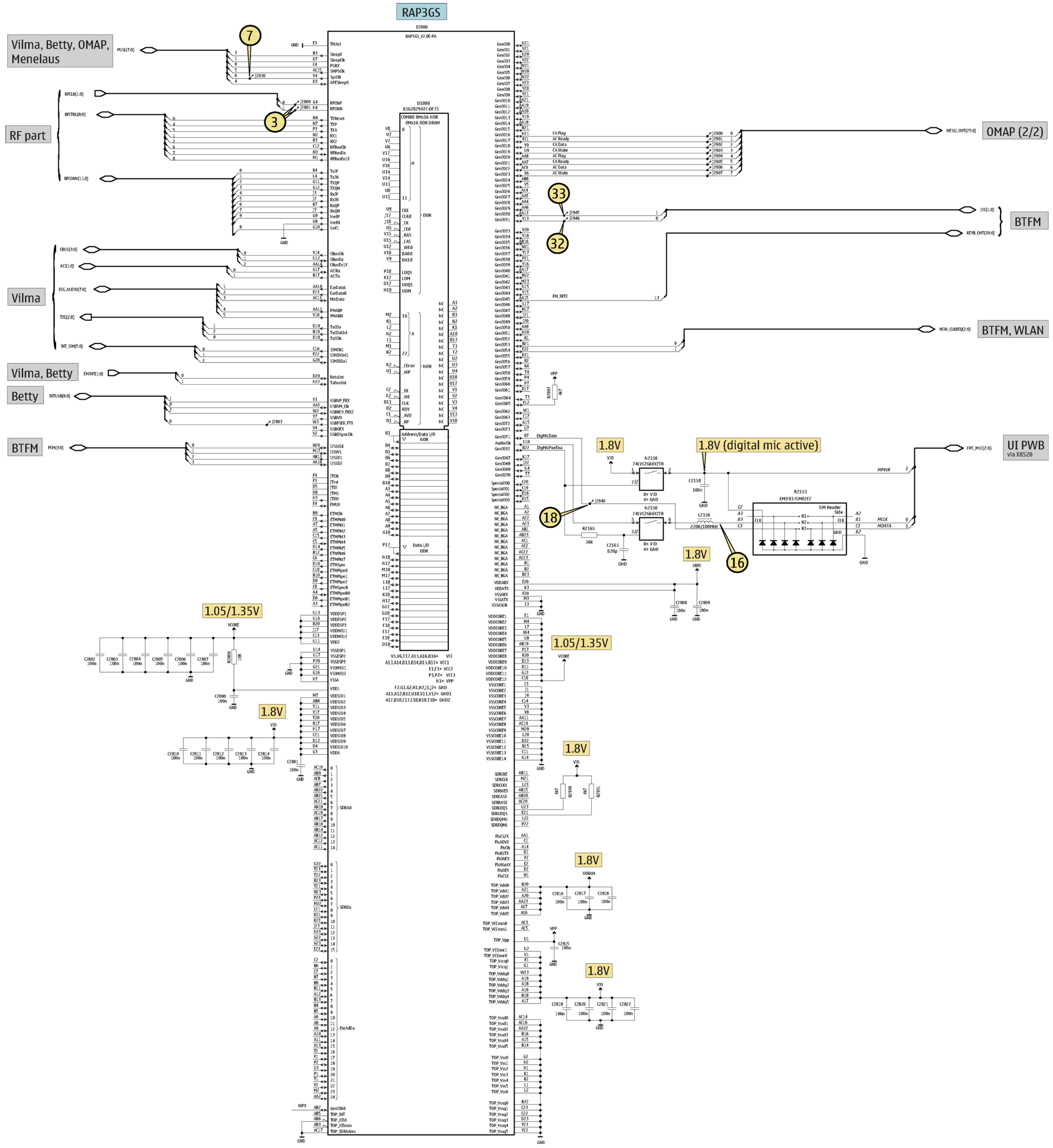
Vilma


Vilma
N2200
VILMA_1.04C
UI PWB
via X8900
AUDIO(6:0)
System connector
XAUDIO(5:0)
Flip PWB
via X8900
IHF_FPC(1:0)
BTFM
AUDIO(6:0)
UI PWB
via Z8802 and X8520
PWRONX(1:0)
2.5V
VANA
R2230
470k
C2205
1n0
Flip PWB
via X8901
SLOWAD(6:0)
RF part
SLOWAD(6:0)
Betty
SLOWAD(6:0)
RFTEMP
WTXDET
VCHAR
R2071
47k
BTEMP NTC
B2200
32.768kHz
G2200
RAP3GS
ACI(1:0)
DIG_AUDIO(7:0)
Betty
CHSWSTAT
CBUS(3:0)
TXC(2:0)
RAP3GS
INT_SIM(5:0)
Battery connector
3.7V
VBAT
X2070
J2086
J2087
BGND
C2070
150u_10V
R2070
14V/50V
J2085
L2202
L2207
L2204
L2203
L2206
L2205
220R/100MHz
600R/100MHz
C2227
C2226
C2225
C2228
C2232
C2231
HV
Mic1P
EarP
EarN
Mic3P
Mic3N
Mic3PR
Mic3NR
PwrOnX
BSI
BTemp
LS
LST
RFTemp
WTxDet
VChar
Crl
CrO
VBack
SIMClk2
SIMDa2
SIMIOC2
WDDis
MBusTx
MBusRx
AudClk
EarDaL
EarDaR
MicData
PMARP
PMARN
ChSwS
SerClk
SerData
SerSelX
TxCClk
TxCCtrl
TxCDa
SIMClk1
SIMDa1
SIMIOC1
Gnd5
Gnd6
Gnd7
VBat6
VBat1
VBat2
VBat3
VBat4
VBat5
VBatCP
VBatH
Mic2N
Mic2P
XEarL
XEarLC
XEarR
XEarRC
MicB1
MicB2
VSARx
VSATx
MicSub
HFSpP
HFSpN
VBG
VRef
VAna
VAux
VDRAM
VIO
VR1
VRFC
VSIM2
VRCP1
VCP
FlyHigh
FlyLow
VilmaInt
MBus
HeadDet
AFC
TxC1
SIMClkC1
SIMDaC1
SIMRstC1
SIMClkC2
SIMDaC2
SIMRstC2
VSIM1
SIMDetX
PURX
SlClk
RstX
SleepX
TM
Gnd1
Gnd2
Gnd3
Gnd4
GndCP
GndH
GndTH
VibraP
VibraN
L2154
L2155
220R/100MHz
C2155
1n0
C2156
1n0
C2157
1n0
R2155
R2154
14V/50V
C2202
2 /2 1u
C2201
1u5
4.75V
VRCP1
1.8V
VRFC
2.5V
VR1
1.8V
VIO
1.8V
VDRAM
2.78V
VAUX
2.5V
VANA
1.35V
VREF
C2200
C2201
C2202
C2203
C2204
C2205
C2206
C2222
1u0
C2220
2x1u
C2213
C2215
C2216
1u5
C2217
1u5
C2211
4u7
C2232
2x1u
EMINT(1:0)
RAP3GS
J2208
USB_ACI(7:0)
Betty, System connector
TXC_CONV(1:0)
RF part
SIMIF_DAU(6:0)
SIM/miniSD PWB
via X8600
2.5V
VANA
100k
R2231
D2230
74LX1G04BJR
4=VANA
2=GND
Z9064
ESDA14V2-4BF2
15
1.8/3V
C2220
2x1u
1.8V
J2216
J2217
J2218
J2219
1
3.7V
1.8V: active
0V: sleep
PUSL(7:0)
RAP3GS, OMAP,
Menelaus, BTFM
Vibra
L2152
L2153
220R/100MHz
C2151
1n0
C2152
12p
C2153
12p
M2150
FM-0035-C1
16
17
5
6
4
39
38
40
J2200
J2201
J2202
J2203
J2204
J2205
J2206
J2207
J2209
J2210
J2211
J2212
J2213
J2214
J2215
J2220
J2221
GND
NC

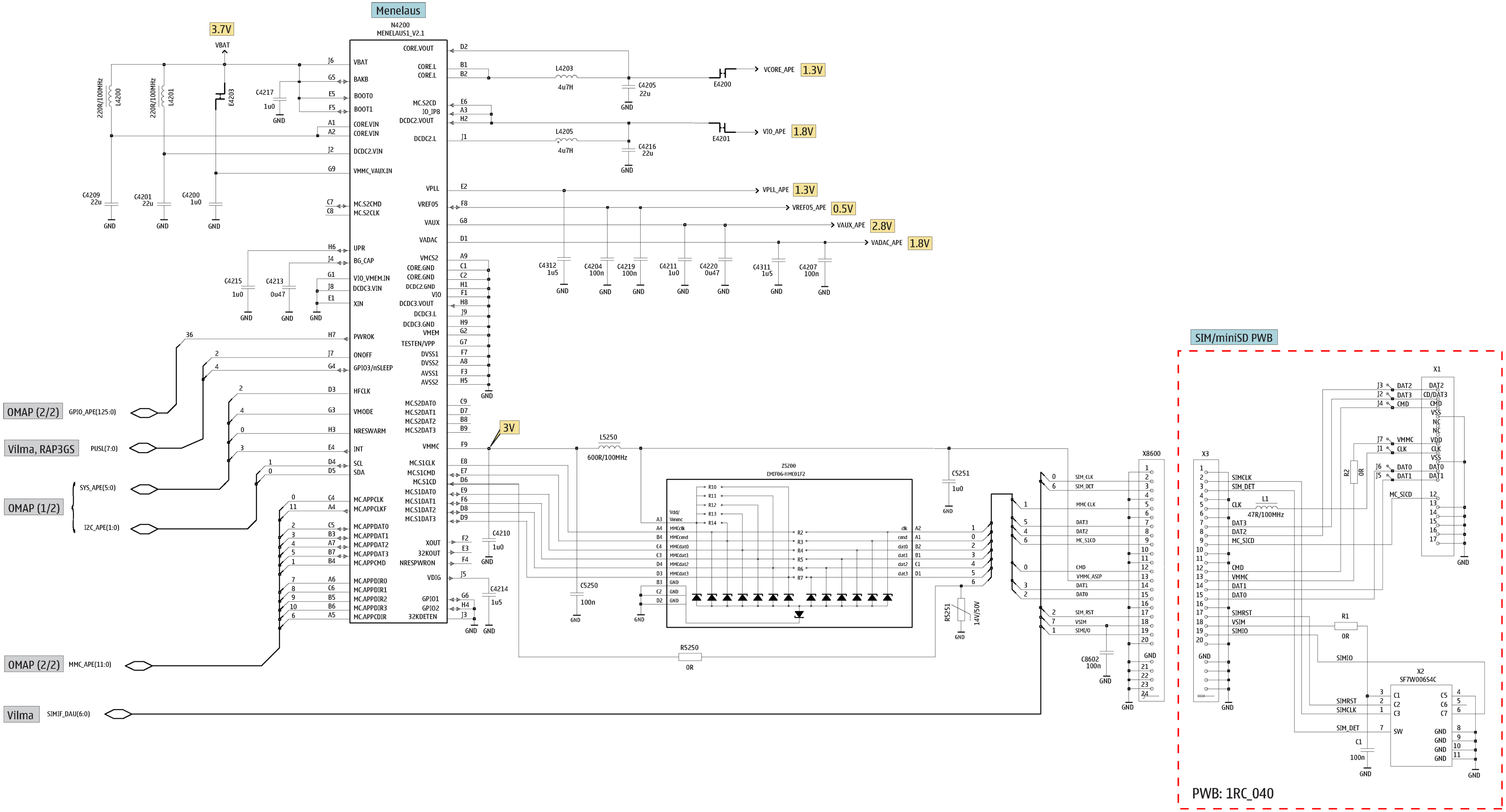
Betty, LED driver


J2060
VPP
VBUS
GND
Betty
N2300
BETTY_V2.1_LF
3.7V
VBAT
L2301
220R/100MHz
C2309
22u
C2300
10n
C2301
22u
E2300
C2307
1u0
1.8V
VIO
E2302
C2304
10n
C2303
1u0
Vilma
SLOWAD(6:0)
CHSWSTAT
J2300
J2301
System connector
CHARGER
J2302
RAP3GS
EMINT(1:0)
1.05/1.35V
VCORE
E2303
C2302
22u
L2302
10uH
J2306
J2307
R2300
CURRENT_SEN
BGND
GND
2.5V
accessory connected
VOUT
C2312
5V
connected to host
VBUS
C2312
2x1u
VBAT1
VBAT1
VCharOut2
VCharOutK
VCharOut1
VBAT3
VIO
VCCint
VCharADC
ChSwS
VCharIn2
VCharInK
VCharIn1
BettyInt
VCoreCoil
VCoreCoil
VCore
SenseM
SenseP
LedCoil
LedCoil
SetCurr
GND1
GND1
GND3
GND4
GND5
GND5
VOUT
FlashM
TestOut
VCC
Slave_PU
Master_PD1
Master_PD2
CLK
RXD2
DP_RXD
DM_TXD
VPP_VIO
OEX
FSEO
VO
RCV_FRX2
VP_FRX
VM_CLK
FTX
SlaveSWSet
CbusData
CbusSelX
CbusClk
RstX
PurX
SleepX
Clk600
SleepClk
SMPSClk
GenOut1
PWM300
GenOut2
LedOut
VCoreDef
VcoreDis
TestMode
USB_ACI(7:0)
Vilma, System connector
INTUSB(8:0)
RAP3GS, OMAP
CBUS(3:0)
RAP3GS
PUSL(7:0)
Vilma, RAP3GS
11
12
10
J2305
J2308
J2310
C2320
10p
V2350
DTC143ZM-T2L
IN
OUT
R1
4k7
R2
47k
SETCURR_KEY
X8520
L2311
22uH
L2310
220R/100MHz
VBAT
3.7V
N2310
4W_LED_DRIVER
IND
VOUT
EN
VDD
FB
AGND
NC
PGND
LED driver
12.8V (illumination active)
C2360
4u7
C2361
4u7
R2381
1k0
R2382
1k0
R2304
1k0
R2305
47R
PEMT1
V2381
PEMT1
V2381
PEMT1
V2302
PEMT1
V2302
VLEDOUT_KEY1
VLEDOUT_KEY3
VLEDOUT_KEY2
X8520
R2385
33R
VLEDOUT_LCD
SUB_LED-
MAIN_LED-
X8901
R2375
120R
R2376
120R
3.7V
VBAT
R2359
100k
V2356
2SK3541
V2354
2SC5658QRS
R2360
1k0
V2357
2SK3541
Display
sub on/main off 1.8V
sub off/main on 0V

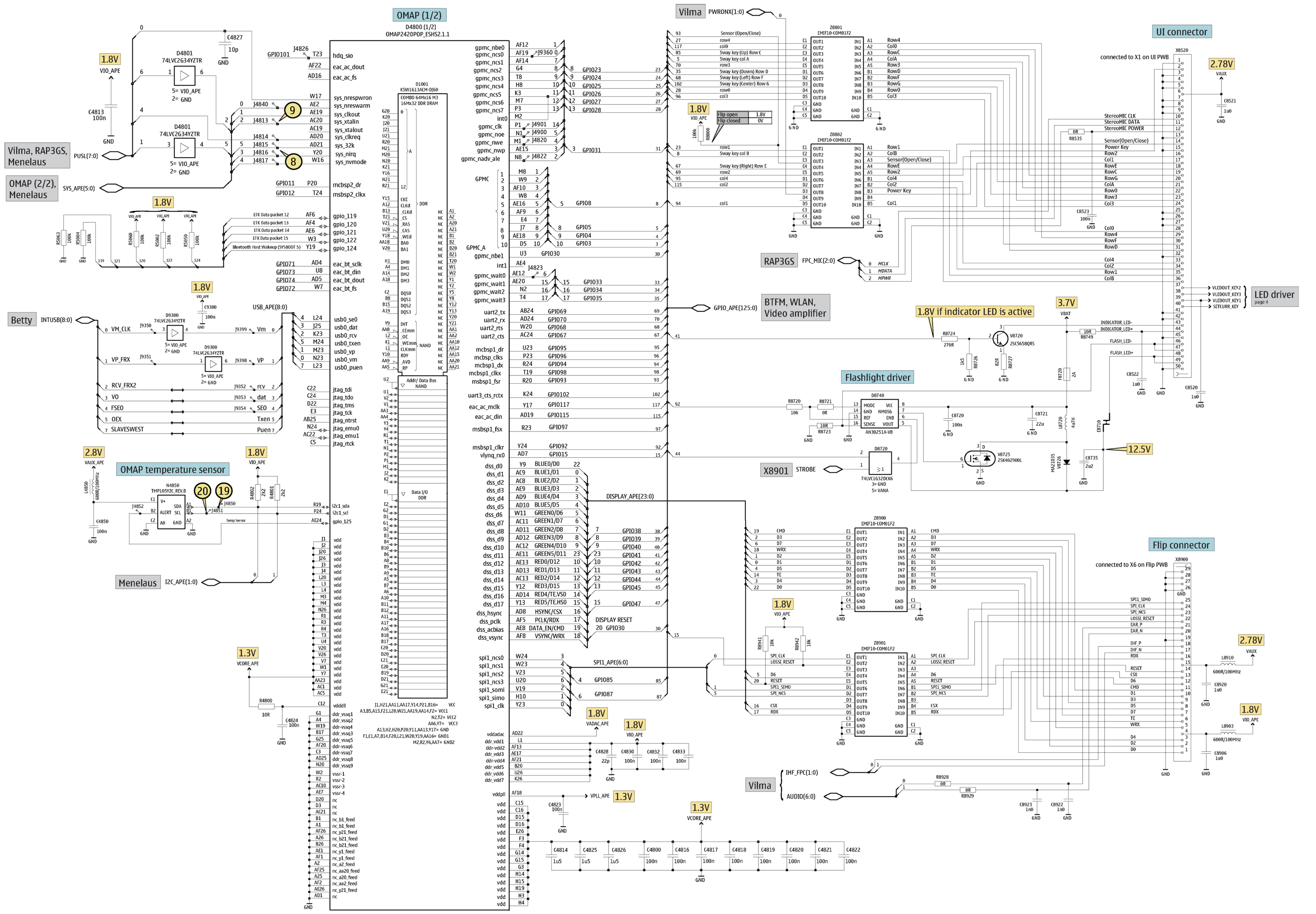
RAP3GS


RAP3GS
D2000
Vilma, Betty, OMAP, Menelaus
7
RF part
3
Vilma
Vilma, Betty
Betty
BTFM
OMAP (2/2)
33
32
BTFM
BTFM, WLAN
1.8V
1.8V (digital mic active)
UI PWB
via X8520
18
16
1.8V
1.05/1.35V
1.05/1.35V
1.8V
1.8V
1.8V
1.8V

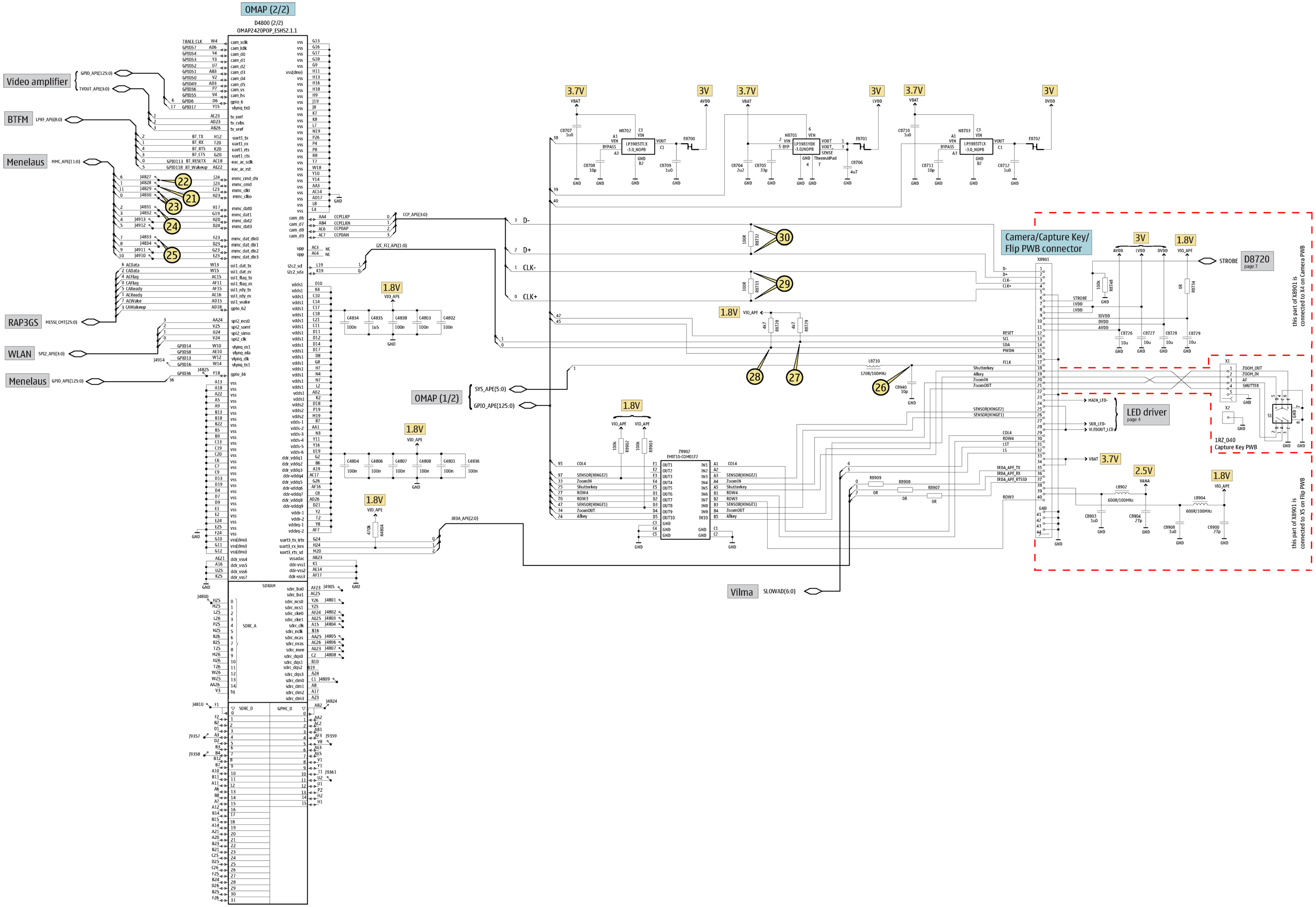
Menelaus, SIM, miniSD


Menelaus
N4200
MENELAUS1_V2.1
3.7V
VBAT
L4200 220R/100MHz
L4201 220R/100MHz
E4203
C4217 1u0
C4209 22u
C4201 22u
C4200 1u0
C4215 1u0
C4213 0u47
GND
VBAT
BAKB
BOOT0
BOOT1
COREVIN
DCDC2.VIN
VMMC_VAUX.IN
MCS2CMD
MCS2CLK
UPR
BG_CAP
VIO_VMEM.IN
DCDC3.VIN
XIN
PWROK
ONOFF
GPIO3/nSLEEP
HFCLK
VMODE
NRESWARM
INT
SCL
SDA
MCAPPCLK
MCAPPCLKF
MCAPPDAT0
MCAPPDAT1
MCAPPDAT2
MCAPPDAT3
MCAPPCMD
MCAPPDIR0
MCAPPDIR1
MCAPPDIR2
MCAPPDIR3
MCAPPCDIR
CORE.VOUT
CORE.L
MCS2CD
IO_IP8
DCDC2.VOUT
DCDC2.L
VPLL
VREF05
VAUX
VADAC
VMCS2
CORE.GND
DCDC2.GND
VIO
DCDC3.VOUT
DCDC3.L
DCDC3.GND
VMEM
TESTEN/VPP
DVSS1
DVSS2
AVSS1
AVSS2
MCS2DAT0
MCS2DAT1
MCS2DAT2
MCS2DAT3
VMMC
MCS1CLK
MCS1CMD
MCS1CD
MCS1DAT0
MCS1DAT1
MCS1DAT2
MCS1DAT3
XOUT
32KOUT
NRESPWRON
VDIG
GPIO1
GPIO2
32KDETEN
L4203 4u7H
C4205 22u
E4200
VCORE_APE
1.3V
L4205 4u7H
C4216 22u
E4201
VIO_APE
1.8V
VPLL_APE
1.3V
VREF05_APE
0.5V
VAUX_APE
2.8V
VADAC_APE
1.8V
C4312 1u5
C4204 100n
C4219 100n
C4211 1u0
C4220 0u47
C4311 1u5
C4207 100n
C4210 1u0
C4214 1u5
3V
L5250 600R/100MHz
C5250 100n
Z5200
EMIF06-HMC01F2
C5251 1u0
R5251 14V/50V
R5250 0R
OMAP (2/2)
GPIO_APE(125:0)
Vilma, RAP3GS
PUSL(7:0)
OMAP (1/2)
SYS_APE(5:0)
I2C_APE(1:0)
OMAP (2/2)
MMC_APE(11:0)
Vilma
SIMIF_DAU(6:0)
X8600
SIM_CLK
SIM_DET
MMC CLK
DAT3
DAT2
MC_SICD
CMD
VMMC_ASIP
DAT1
DAT0
SIM_RST
VSIM
SIM I/O
C8602 100n
SIM/miniSD PWB
X3
SIMCLK
SIM_DET
CLK
L1 47R/100MHz
DAT3
DAT2
MC_SICD
CMD
VMMC
DAT1
DAT0
SIMRST
VSIM
SIMIO
R1 0R
R2 0R
X1
DAT2
CD/DAT3
CMD
VSS
NC
VDD
CLK
VSS
DAT0
DAT1
MC_SICD
X2
SF7W006S4C
SIMIO
SIMRST
SIMCLK
SIM_DET
SW
C1 100n
PWB: 1RC_040

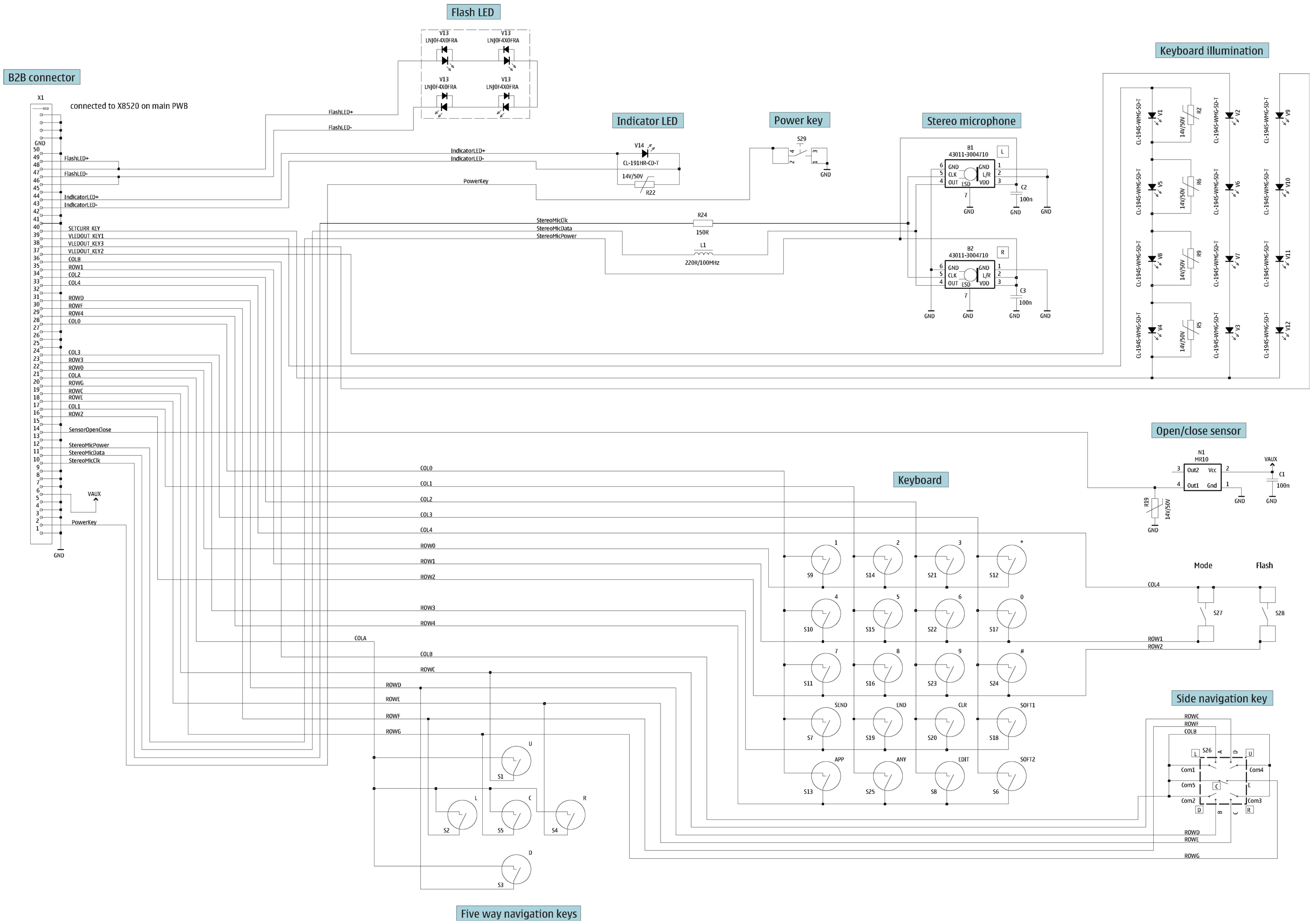
OMAP 1/2


OMAP (1/2)
D4800 (1/2)
OMAP2420POP_ESHS2.1.1
Vilma
PWRONX(1:0)
UI connector
connected to X1 on UI PWB
2.78V
VAUX
1.8V
VIO_APE
D4801
74LVC2G34YZTR
Vilma, RAP3GS, Menelaus
PUSL(7:0)
OMAP (2/2), Menelaus
SYS_APE(5:0)
9
8
D1001
K5W1613ACM-DJ60
Z8801
CMF10-COM01F2
Z8802
CMF10-COM01F2
Flip open
Flip closed
RAP3GS
FPC_MIC(2:0)
BTFM, WLAN, Video amplifier
GPIO_APE(125:0)
LED driver
3.7V
VBAT
1.8V if indicator LED is active
Flashlight driver
D8740
AN30251A-VB
12.5V
X8901
STROBE
D8720
Betty
INTUSB(8:0)
D9300
74LVC2G34YZTR
USB_APE(8:0)
2.8V
VAUX_APE
OMAP temperature sensor
N4850
TMP105YZC_REV.B
20
19
Menelaus
I2C_APE(1:0)
DISPLAY_APE(23:0)
DISPLAY RESET
SPI1_APE(6:0)
Z8900
CMF10-COM01F2
Z8901
CMF10-COM01F2
Flip connector
connected to X6 on Flip PWB
X8900
1.3V
VCORE_APE
1.8V
VADAC_APE
1.8V
VIO_APE
1.3V
VPLL_APE
1.3V
VCORE_APE
Vilma
IHF_FPC(1:0)
AUDIO(6:0)
2.78V
VAUX
1.8V
VIO_APE
GND

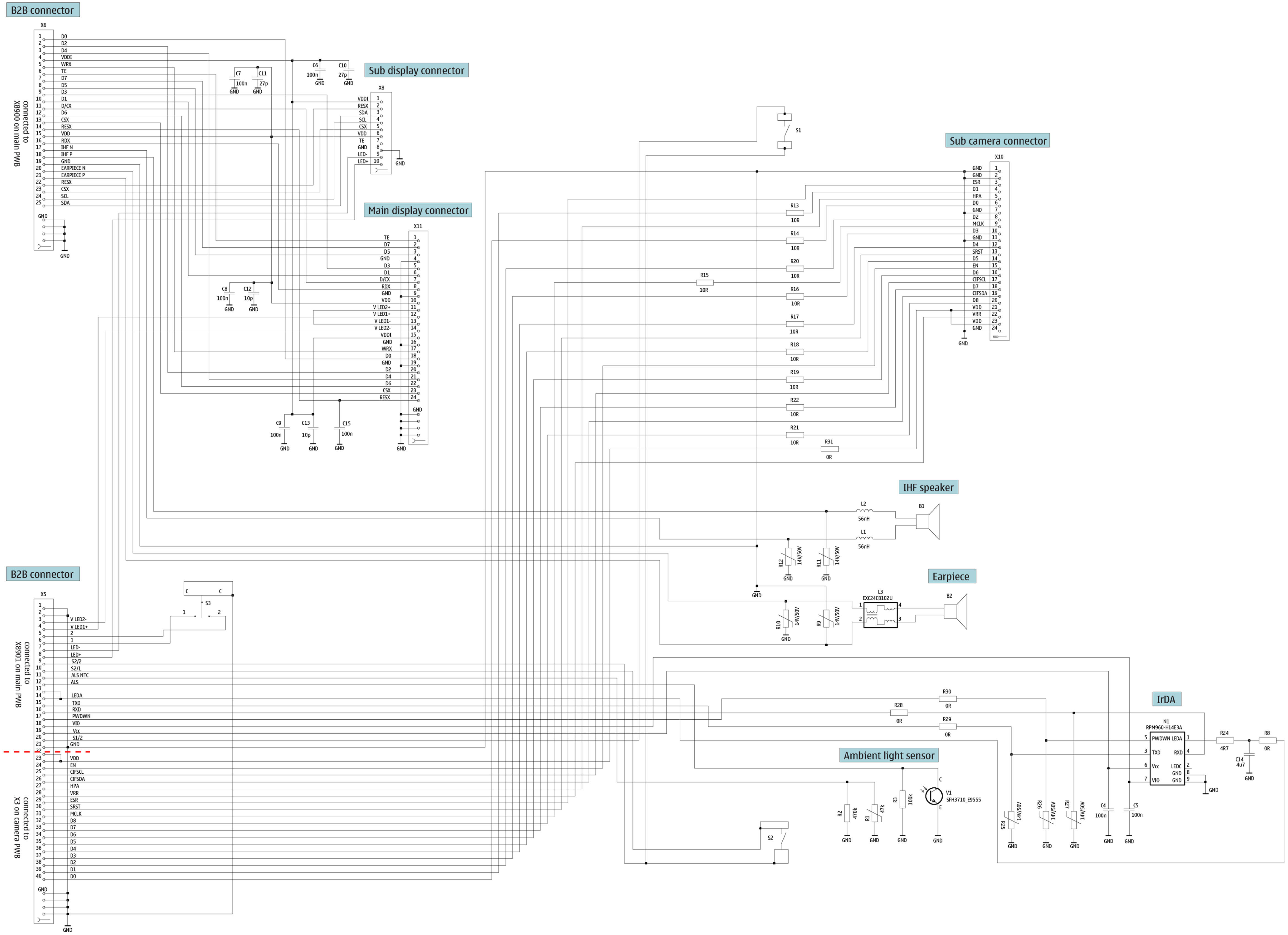
OMAP 2/2


OMAP (2/2)
D4800 (2/2)
OMAP2420POP_ESHS2.1.1
Video amplifier
GPIO_APE(125:0)
TVOUT_APE(3:0)
BTFM
LPRF_APE(8:0)
Menelaus
MMC_APE(11:0)
RAP3GS
MISSI_CMT(25:0)
WLAN
SPI2_APE(3:0)
Menelaus
GPIO_APE(125:0)
OMAP (1/2)
SYS_APE(5:0)
GPIO_APE(125:0)
Vilma
SLOWAD(6:0)
CCP_APE(3:0)
I2C_FCI_APE(1:0)
IRDA_APE(2:0)
D-
D+
CLK-
CLK+
3.7V
3V
3.7V
3V
3.7V
3V
1.8V
1.8V
1.8V
1.8V
1.8V
1.8V
3V
1.8V
3.7V
2.5V
1.8V
Camera/Capture Key/
Flip PWB connector
X8901
STROBE
D8720
page 7
LED driver
page 4
MAIN_LED-
SUB_LED-
VLEDOUT_LCD
Z8902
X1
X2
1RZ_040
Capture Key PWB
this part of X8901 is connected to X4 on Camera PWB
this part of X8901 is connected to X5 on Flip PWB
SDRAM
SDRC_A
SDRC_D
GPMC_D
21
22
23
24
25
26
27
28
29
30

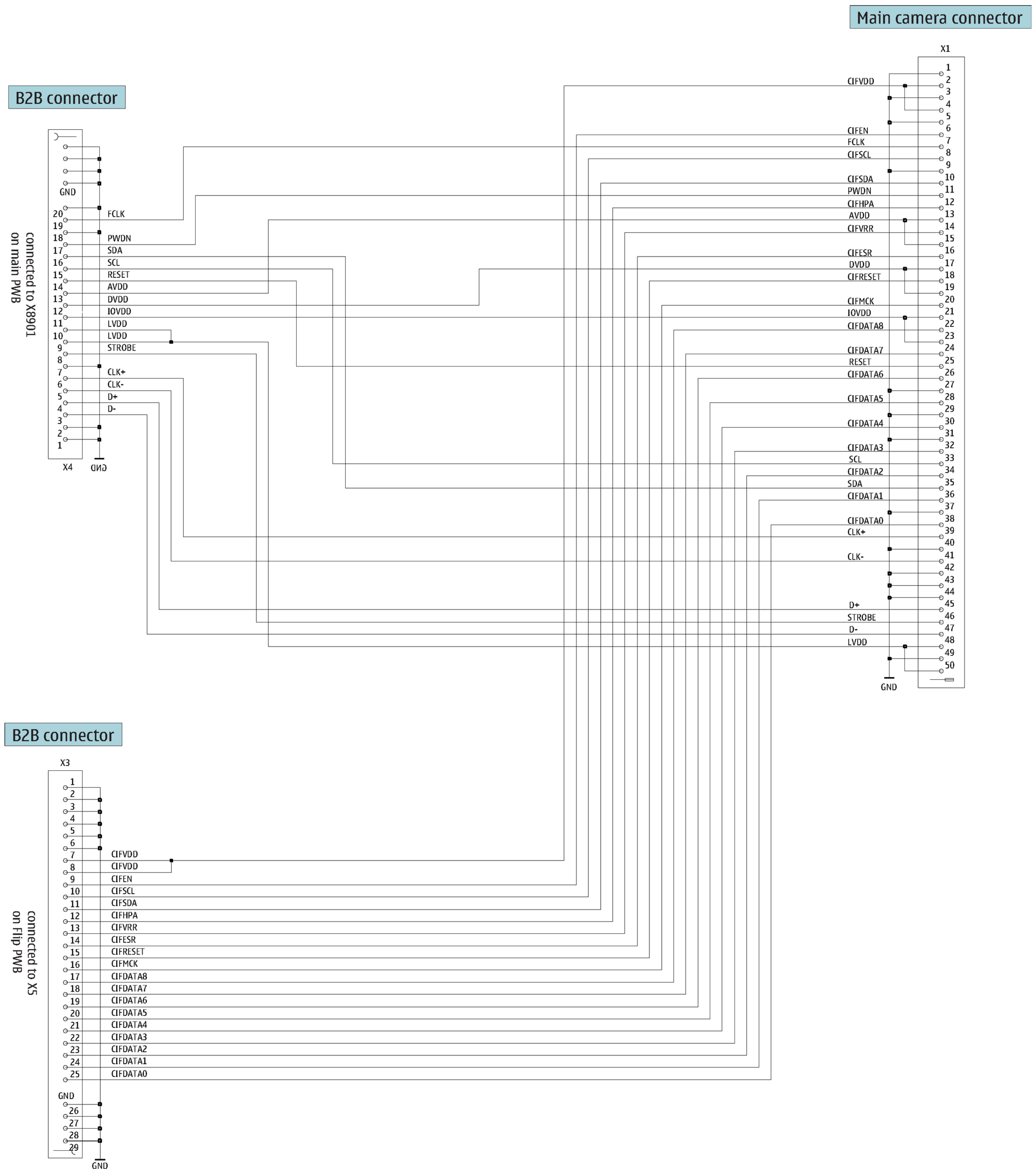
UI PWB


B2B connector
X1
connected to X8520 on main PWB
GND
FlashLED+
FlashLED-
IndicatorLED+
IndicatorLED-
SETCURR_KEY
VLEDOUT_KEY1
VLEDOUT_KEY3
VLEDOUT_KEY2
COLB
ROW1
COL2
COL4
ROWD
ROWF
ROW4
COL0
COL3
ROW3
ROW0
COLA
ROWG
ROWC
ROWE
COL1
ROW2
SensorOpenClose
StereoMicPower
StereoMicData
StereoMicClk
VAUX
PowerKey
Flash LED
V13
LNJ0F4X0FRA
Indicator LED
V14
CL-191HR-CD-T
14V/50V
R22
PowerKey
Power key
S29
Stereo microphone
B1
43011-3004710
B2
GND
CLK
OUT
ESD
L/R
VDD
C2
C3
100n
R24
150R
L1
220R/100MHz
StereoMicClk
StereoMicData
StereoMicPower
Keyboard illumination
CL-194S-WMG-SD-T
V1
V2
V3
V4
V5
V6
V7
V8
V9
V10
V11
V12
R2
R5
R6
R9
14V/50V
Open/close sensor
N1
MR10
Out2
Vcc
Out1
Gnd
C1
R19
Keyboard
S9
S14
S21
S12
S10
S15
S22
S17
S11
S16
S23
S24
S7
S19
S20
S18
S13
S25
S8
S6
SEND
END
CLR
SOFT1
APP
ANY
EDIT
SOFT2
Mode
Flash
S27
S28
Side navigation key
S26
Com1
Com2
Com3
Com4
Com5
Five way navigation keys
S1
S2
S3
S4
S5
U
L
C
R
D

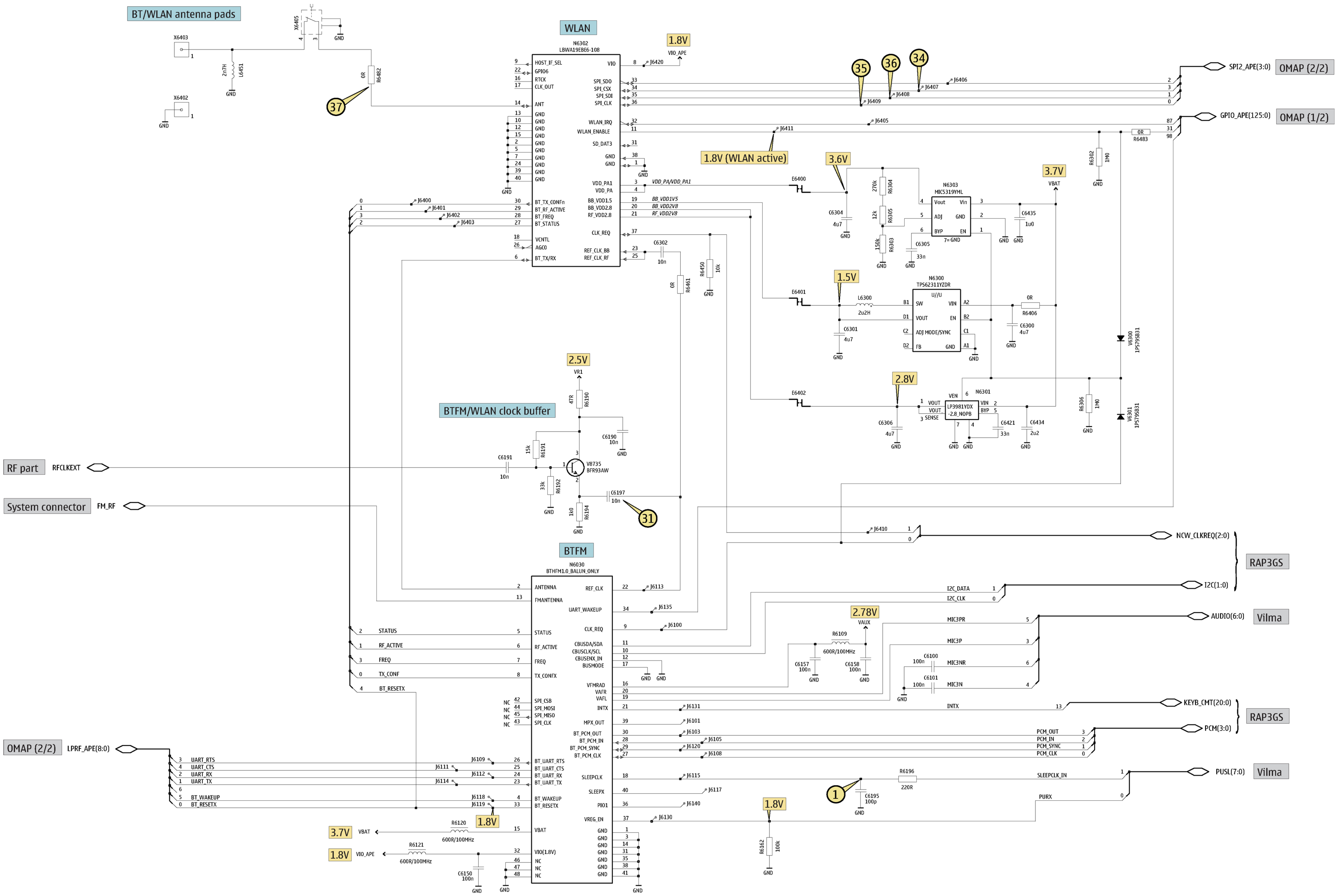
Flip PWB


B2B connector
X6
connected to X8900 on main PWB
Sub display connector
X8
Main display connector
X11
S1
Sub camera connector
X10
IHF speaker
B1
L1
L2
56nH
Earpiece
B2
L3
EXC24CB102U
B2B connector
X5
connected to X8901 on main PWB
connected to X3 on camera PWB
S3
S2
IrDA
N1
RPM960-H14E3A
Ambient light sensor
V1
SFH3710_E9555
GND

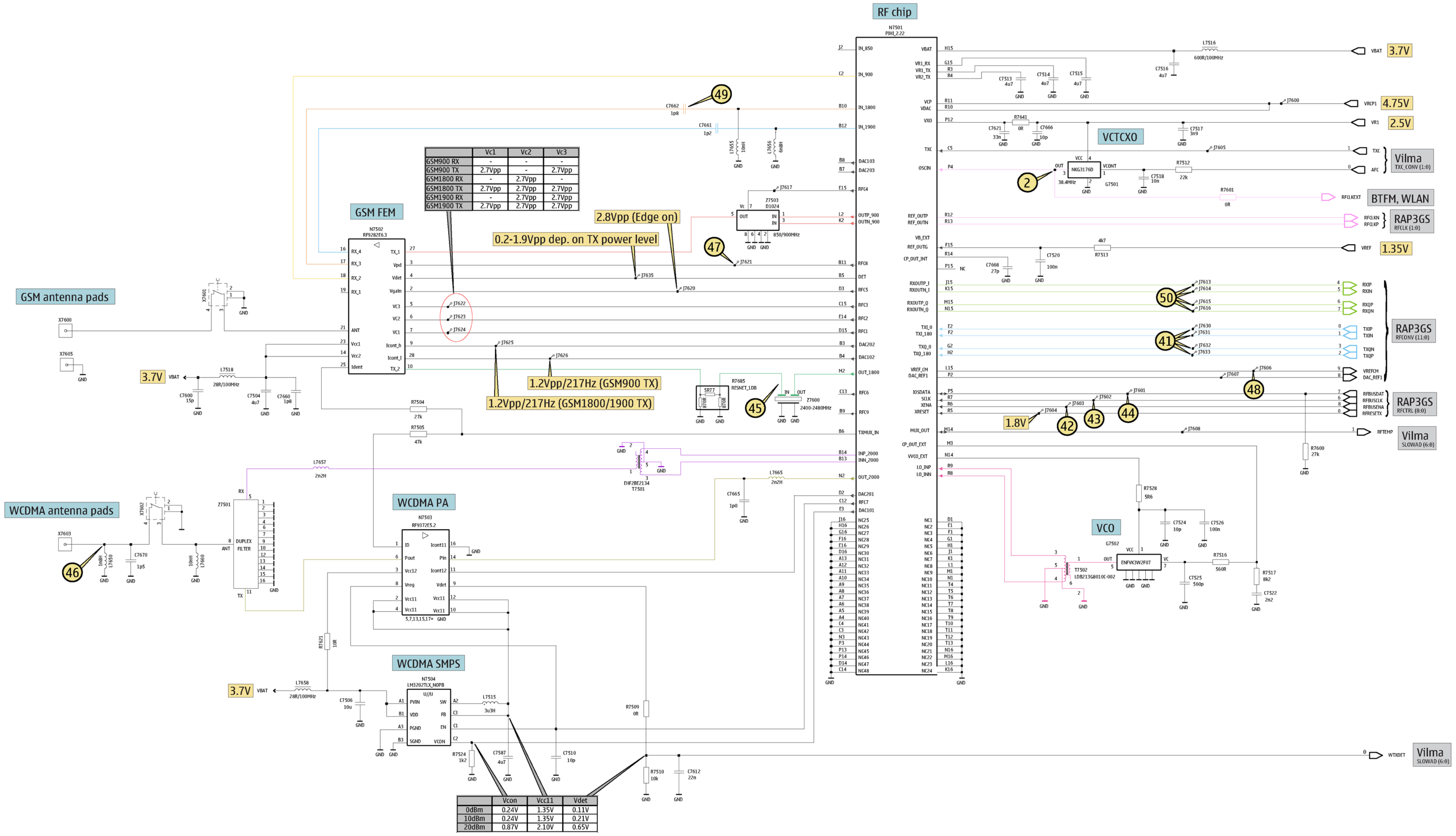
Camera PWB


Main camera connector
X1
CIFVDD
CIFEN
FCLK
CIFSCL
CIFSDA
PWDN
CIFHPA
AVDD
CIFVRR
CIFESR
DVDD
CIFRESET
CIFMCK
IOVDD
CIFDATA8
CIFDATA7
RESET
CIFDATA6
CIFDATA5
CIFDATA4
CIFDATA3
SCL
CIFDATA2
SDA
CIFDATA1
CIFDATA0
CLK+
CLK-
D+
STROBE
D-
LVDD
GND
B2B connector
GND
FCLK
PWDN
SDA
SCL
RESET
AVDD
DVDD
IOVDD
LVDD
LVDD
STROBE
CLK+
CLK-
D+
D-
X4
GND
connected to X8901 on main PWB
B2B connector
X3
CIFVDD
CIFVDD
CIFEN
CIFSCL
CIFSDA
CIFHPA
CIFVRR
CIFESR
CIFRESET
CIFMCK
CIFDATA8
CIFDATA7
CIFDATA6
CIFDATA5
CIFDATA4
CIFDATA3
CIFDATA2
CIFDATA1
CIFDATA0
GND
GND
connected to X5 on Flip PWB

BTFM, WLAN


BT/WLAN antenna pads
X6403
X6402
X6405
L6451
2n7H
GND
R6482
0R
37
WLAN
N6302
LBWA19EB66-108
1.8V
VIO_APE
J6420
35
36
34
J6406
J6407
J6408
J6409
SPI2_APE(3:0)
OMAP (2/2)
GPIO_APE(125:0)
OMAP (1/2)
J6405
J6411
R6483
1.8V (WLAN active)
3.6V
3.7V
VBAT
E6400
R6304
270k
R6305
12k
R6303
150k
C6304
4u7
N6303
MIC5319YML
C6305
33n
C6435
1u0
R6302
1M0
J6400
J6401
J6402
J6403
C6302
10n
R6450
10k
R6461
0R
E6401
1.5V
L6300
2u2H
N6300
TPS62311YZDR
C6301
4u7
R6406
C6300
4u7
V6300
1PS79SB31
E6402
2.8V
N6301
LP3981YDX-2.8_NOPB
C6306
4u7
C6421
33n
C6434
2u2
R6306
1M0
V6301
1PS79SB31
2.5V
VR1
R6190
47R
BTFM/WLAN clock buffer
C6190
10n
RF part
RFCLKEXT
C6191
10n
R6191
15k
V8735
BFR93AW
R6192
33k
C6197
10n
31
R6194
1k0
System connector
FM_RF
J6410
NCW_CLKREQ(2:0)
RAP3GS
BTFM
N6030
BTHFM1.0_BALUN_ONLY
J6113
J6135
J6100
I2C(1:0)
2.78V
VAUX
R6109
600R/100MHz
C6157
100n
C6158
100n
C6100
100n
C6101
100n
AUDIO(6:0)
Vilma
J6131
KEYB_CMT(20:0)
J6101
J6103
J6105
J6120
J6108
PCM(3:0)
OMAP (2/2)
LPRF_APE(8:0)
J6109
J6111
J6112
J6114
J6118
J6119
J6115
R6196
220R
PUSL(7:0)
1
C6195
100p
J6117
J6140
1.8V
J6130
R6162
100k
3.7V
VBAT
1.8V
VIO_APE
R6120
600R/100MHz
R6121
600R/100MHz
C6150
100n
GND

RF part


RF chip
N7501
GSM FEM
N7502
GSM antenna pads
WCDMA antenna pads
WCDMA PA
N7503
WCDMA SMPS
N7504
VCTCXO
VCO
3.7V
4.75V
2.5V
1.35V
1.8V
Vilma
BTFM, WLAN
RAP3GS
2.8Vpp (Edge on)
0.2-1.9Vpp dep. on TX power level
1.2Vpp/217Hz (GSM900 TX)
1.2Vpp/217Hz (GSM1800/1900 TX)
49
47
45
46
2
50
41
48
42
43
44

	Vc1	Vc2	Vc3
GSM900 RX	-	-	-
GSM900 TX	2.7Vpp	-	2.7Vpp
GSM1800 RX	-	2.7Vpp	-
GSM1800 TX	2.7Vpp	2.7Vpp	2.7Vpp
GSM1900 RX	-	2.7Vpp	2.7Vpp
GSM1900 TX	2.7Vpp	2.7Vpp	2.7Vpp

	Vcon	Vcc11	Vdet
0dBm	0.24V	1.35V	0.11V
10dBm	0.24V	1.35V	0.21V
20dBm	0.87V	2.10V	0.65V

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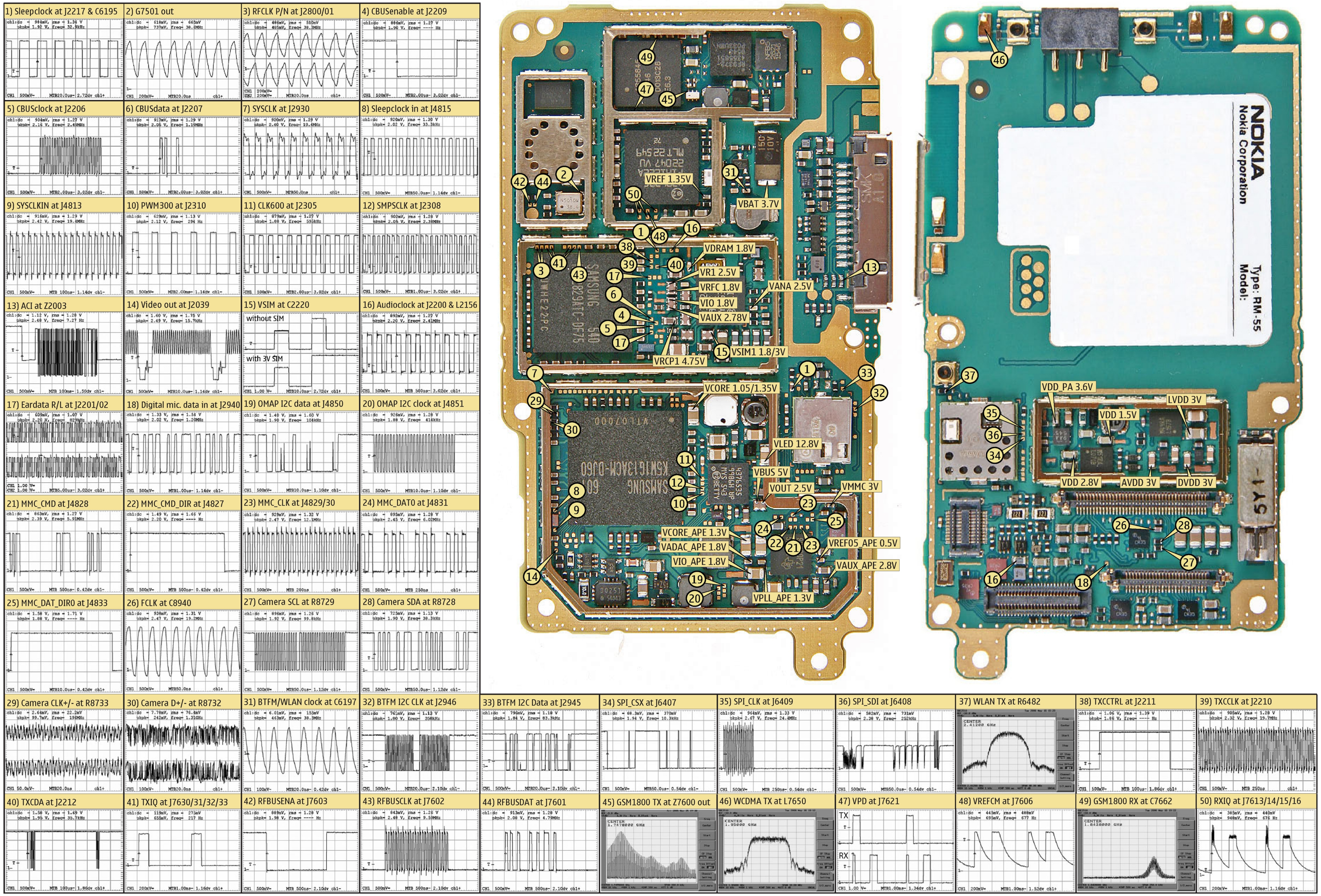
Signal overview


1) Sleepclock at J2217 & C6195
2) G7501 out
3) RFCLK P/N at J2800/01
4) CBUSenable at J2209
5) CBUSclock at J2206
6) CBUSdata at J2207
7) SYSCLK at J2930
8) Sleepclock in at J4815
9) SYSCLKIN at J4813
10) PWM300 at J2310
11) CLK600 at J2305
12) SMPSCLK at J2308
13) ACI at Z2003
14) Video out at J2039
15) VSIM at C2220
without SIM
with 3V SIM
16) Audioclock at J2200 & L2156
17) Eardata R/L at J2201/02
18) Digital mic. data in at J2940
19) OMAP I2C data at J4850
20) OMAP I2C clock at J4851
21) MMC_CMD at J4828
22) MMC_CMD_DIR at J4827
23) MMC_CLK at J4829/30
24) MMC_DAT0 at J4831
25) MMC_DAT_DIR0 at J4833
26) FCLK at C8940
27) Camera SCL at R8729
28) Camera SDA at R8728
29) Camera CLK+/- at R8733
30) Camera D+/- at R8732
31) BTFM/WLAN clock at C6197
32) BTFM I2C CLK at J2946
33) BTFM I2C Data at J2945
34) SPI_CSX at J6407
35) SPI_CLK at J6409
36) SPI_SDI at J6408
37) WLAN TX at R6482
38) TXCCTRL at J2211
39) TXCCLK at J2210
40) TXCDA at J2212
41) TXIQ at J7630/31/32/33
42) RFBUSENA at J7603
43) RFBUSCLK at J7602
44) RFBUSDAT at J7601
45) GSM1800 TX at Z7600 out
46) WCDMA TX at L7650
47) VPD at J7621
TX
RX
48) VREFCM at J7606
49) GSM1800 RX at C7662
50) RXIQ at J7613/14/15/16
VREF 1.35V
VBAT 3.7V
VDRAM 1.8V
VR1 2.5V
VRFC 1.8V
VANA 2.5V
VIO 1.8V
VAUX 2.78V
VRCP1 4.75V
VSIM1 1.8/3V
VCORE 1.05/1.35V
VLED 12.8V
VBUS 5V
VOUT 2.5V
VMMC 3V
VCORE_APE 1.3V
VADAC_APE 1.8V
VIO_APE 1.8V
VREF05_APE 0.5V
VAUX_APE 2.8V
VPLL_APE 1.3V
VDD_PA 3.6V
VDD 1.5V
LVDD 3V
VDD 2.8V
AVDD 3V
DVDD 3V
NOKIA
Nokia Corporation
Type: RM-55
Model:

Component finder

B	
B2200	F8
C	
C2000	D6
C2002	C7
C2003	C7
C2012	D5
C2033	C9
C2034	C9
C2035	C9
C2036	D9
C2041	J15
C2042	I16
C2043	D7
C2070	D5
C2151	J12
C2152	J12
C2153	J12
C2155	G17
C2156	G17
C2157	G17
C2158	D16
C2165	H10
C2201	G9
C2202	E8
C2205	E8
C2211	G10
C2213	G9
C2215	G9
C2216	F8
C2217	E9
C2220	F10
C2222	G9
C2225	F10
C2226	G8
C2227	F9
C2228	F9
C2231	F10
C2232	F10
C2300	E13
C2301	F13
C2302	F12
C2303	E14
C2304	F13
C2307	E14
C2309	F12
C2312	E14
C2320	E14
C2360	E12
C2361	E13
C2800	H9
C2801	J10
C2802	I8
C2803	H9
C2804	H8
C2805	J9
C2806	H10
C2807	J10
C2808	J9
C2809	H8
C2810	H8
C2811	I10
C2812	H8
C2813	I8
C2814	H9
C2815	J9
C2816	H10
C2817	H8
C2818	J10
C2819	H8
C2820	J10
C2821	J8
C2822	H10
C4200	C16
C4201	D16
C4204	C15
C4205	E15
C4207	J14
C4209	E15
C4210	C15
C4211	C16
C4213	D16
C4214	D16
C4215	C16
C4216	E16
C4217	D16
C4219	I15
C4220	C16
C4311	E15
C4312	E15
C4800	F13
C4801	H15
C4802	I11
C4803	J12
C4804	F13
C4806	F12
C4807	H11
C4808	H11
C4813	J15
C4814	G11
C4816	G11
C4817	H11
C4818	H11
C4819	I11
C4820	G15
C4821	H15
C4822	H15
C4823	J13
C4824	F13
C4825	G15
C4826	F14
C4827	F13
C4828	F14
C4830	H15
C4832	J14
C4833	J13
C4834	F12
C4835	F14
C4836	F14
C4838	I15
C4850	G15
C5250	C14
C5251	C14
C6100	D12
C6101	D12
C6150	C13
C6157	D11
C6158	C11
C6190	E5
C6191	E6
C6195	D11
C6197	E6
C6300	F12
C6301	F13
C6302	D14
C6304	E12
C6305	E13
C6306	E13
C6421	G13
C6434	E13
C6435	E12
C7504	F3
C7506	E4
C7510	F3
C7513	H6
C7514	H5
C7515	F7
C7516	G7
C7517	J6
C7518	J7
C7520	F6
C7522	I5
C7524	J5
C7525	I5
C7526	J5
C7587	E4
C7600	F2
C7612	F5
C7621	H6
C7660	H2
C7661	G2
C7662	G2
C7665	H5
C7666	H6
C7668	H7
C7670	D2
C8520	E15
C8521	F17
C8522	E15
C8523	E17
C8602	B15
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C8706	H12
C8707	H13
C8708	H13
C8709	G13
C8710	I13
C8711	I13
C8712	H13
C8720	H16
C8721	G15
C8726	H15
C8727	I15
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C8729	I15
C8735	H16
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C8920	H17
C8922	E9
C8923	E9
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C9300	F14
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D1001	H13
D2031	I15
D2032	C8
D2230	E8
D2800	I9
D4800	H13
D4801	J14
D8720	H15
D8740	H16
D9300	F14
F	
F2000	C5
F8720	H15
G	
G2200	E7
G7501	I7
G7502	J5
J	
J2037	C9
J2038	C9
J2039	J15
J2060	D9
J2085	F4
J2086	E4
J2087	G4
J2200	G8
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J2220	G8
J2221	G8
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L2302	F12
L2310	E11
L2311	E12
L4200	D14
L4201	D16
L4203	F15
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N2310	E13
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N6030	C12
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N6301	F13
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N7501	G6
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N7503	E3
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N8702	H13
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R2010	D5
R2040	E9
R2041	E9
R2042	E9
R2043	E9
R2046	C6
R2051	C8
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R2062	I16
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R2065	D8
R2066	D8
R2070	D2
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R2153	D16
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R2931	H9
R4800	F13
R4801	H15
R4802	H15
R4804	F15
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R5250	C15
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R7510	F5
R7512	J7
R7513	F7
R7516	I5
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R7600	J6
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R7621	E4
R7641	H6
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R8726	E15
R8727	E15
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R8733	J12
R8734	I15
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R8929	E9
R8941	F17
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T	
T7501	F6
T7502	I6
V	
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V2350	F16
V2354	D14
V2356	E15
V2357	E14
V2381	D15
V6300	G13
V6301	G13
V8720	E15
V8725	G16
V8726	G16
V8735	E6
X	
X2001	B7
X2060	B16
X2070	F2
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X6403	B7
X6405	B11
X7600	H2
X7601	G2
X7602	D2
X7603	C2
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X8600	C15
X8900	H16
X8901	G14
Z	
Z2000	C8
Z2001	C8
Z2003	C8
Z2030	D6
Z5200	C15
Z7501	D3
Z7503	J4
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Z8900	H17
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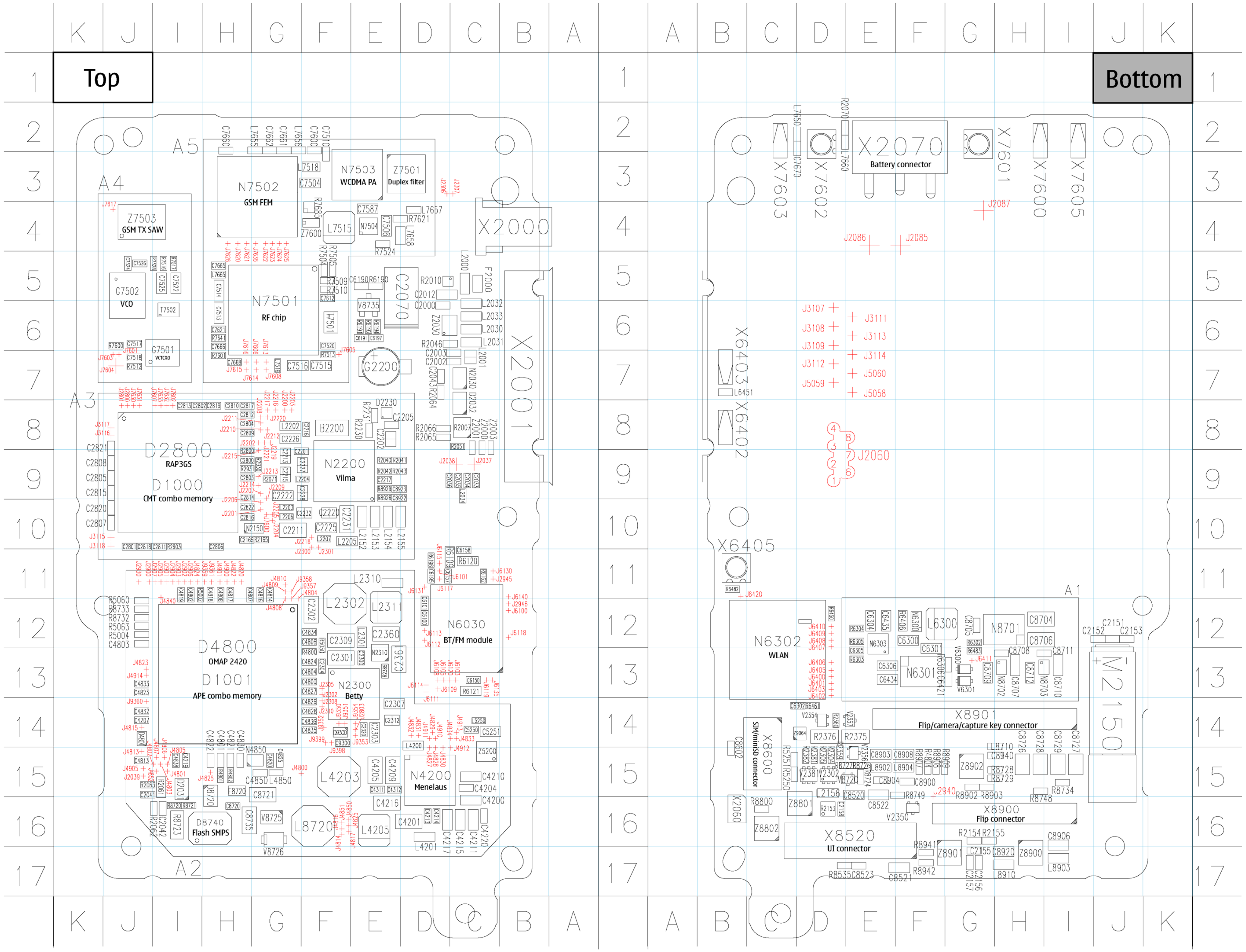
Top
Bottom
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A B C D E F G H I J K
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A5
A4
A3
A2
A1
N7502
GSM FEM
N7503
WCDMA PA
Z7501
Duplex filter
Z7503
GSM TX SAW
C7502
VCO
N7501
RF chip
G7501
VCTCXO
X2000
X2001
C2070
G2200
D2800
RAP3GS
D1000
CMT combo memory
N2200
Vilma
B2200
D4800
OMAP 2420
D1001
APE combo memory
N2300
Betty
L2310
L2302
L2311
N6030
BT/FM module
L4203
N4200
Menelaus
L4205
L8720
D8740
Flash SMPS
X2070
Battery connector
X7603
X7602
X7601
X7600
X7605
J2087
J2086
J2085
J2060
X6403
X6402
X6405
N6302
WLAN
L6300
N8701
N6301
X8901
Flip/camera/capture key connector
X8600
SIM/miniSD connector
X8900
Flip connector
X8520
UI connector
M2150